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A NEW KEY TO SPECIES OF REUTEROSCOPUS KIRK. WITH DESCRIPTIONS OF NEW SPECIES (HEMIPTERA, MIRIDAE)

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ABSTRACT. The genus Reuteroscopus Kirkaldy (1905) is known only from North America, chiefly from the southern United States, Mexico, Central America, and Caribbean Islands. Descriptions are given for 22 new species, making a total of 39 species for the genus; all species are included in the key. New species of Reuteroscopus are abroniae from Colorado, Nebraska and Texas; basicornis, pallidiclavus, and santaritae from Arizona; carolinae from North Carolina; schaffneri from Texas; dreisbachi from Arizona and Mexico; brevicornis, brevirostris, brevis, burkei, croceus, cuernavacae, fuscatus, gracilicornis, grandis, immaculatus, luteus, medius, obscurus, and nigricornis from Mexico. Psallus tinctipennis Knight (1923) is transferred to Reuteroscopus.

The genus Reuteroscopus Kirkaldy (1905) was revised recently by Kelton (1964) with a key to all the species known to him. His key works very well for the species covered, but when I began working out all the material we have accumulated, I was much surprised to find several more species requiring description. Now I have prepared a key to separate all the species known to the writer, which raises the number of species to 39 for the genus Reuteroscopus.

The writer collected his first Mirid in 1911, a specimen of Microphylellus modestus Reuter, which was observed sucking eggs of the elm-leaf beetle (Galerucella xanthomelaena). We still have this specimen, and it was the beginning of what has turned out to be a lifetime project in Systematic Entomology. The Hemiptera specialists of that day could do little with the multitude of species and left them for later students with binocular microscopes. This was the state of affairs when we acquired a binocular microscope in 1911 and began studies on the plant bugs which have lasted up to now. Our first publication appeared in 1915, a paper on the oviposition habits of certain Capsids, and now with the present paper we mark fifty years of publishing on the plant bugs, family Miridae.

In the present study we have given consideration to external characters of Reuteroscopus, and testing their value for use in a key. Dr. Kelton (1964) has demonstrated with illustrations the value of structures in the

aedaegus for separating species. But few workers will be able, or want to take the time to examine these structures when making identifications, so it is important to be able to separate species on external characters employed in a key. In this respect we may say that external features of the male genital segment rate high in importance, such as the presence or absence of a dorsal tubercle. The length of the rostrum may provide useful characters, such as just attaining the hind coxae, or extending as far as the hind trochanters, or reaching to sixth or seventh ventral segments, or even upon the genital segment. For this purpose one must have normal specimens, not teneral, or specimens squashed out of normal shape. Length and thickness of antennal segments furnish useful characters, especially segment II, which may be compared with basal width of pronotum; also the thickness of segment II may be compared with thickness of fore tibia. We have measured many specimens of a few species to check on possible variations. We find in actual measurements the extent of variations fall within a space of .03 mm when we compare the length of antennal segment II with basal width of pronotum. In two species we found where segment II measures .05 mm or .06 mm greater than basal width of pronotum, we can say that length of segment II is slightly greater than basal width of pronotum. After measuring a series of male specimens of ornatus Reut. we can say that length of antennal segment II is equal, or approximately equal to basal width of pronotum; the plus or minus variation falls within a range of .03 mm. For another example we measured a series of male specimens of schaffneri and found antennal segment II exceeds basal width of pronotum by a space of .07 mm to .10 mm; in this case we may say that length of segment II is greater than basal width of pronotum.

Color characters may sometimes be used in a key, but only after we have studied a large series of species concerned. In Reuteroscopus we have the "ornatus" type of color pattern, where the dark colors have sharp edges, with no blending. Also we have a group of species with a "diffuse" type of coloring, wherein the dark colors blend into the light color, with no sharp lines of demarcation between light and dark colors.

Differences in pubescence may furnish good distinctions for some species, but these characters are perhaps the most difficult to describe accurately. One difficulty is that specimens may lose pubescence due to rough handling, such as mixing them with Coleoptera in the killing bottle. We urge collectors to use great care in handling specimens, and use plenty of shredded cellucotton as a buffer in the killing bottles, so that specimens will not slide around and rub off the pubescence.

In the key and in descriptions we refer to the fuscous or black spot which may appear on the ventral surface of the male genital segment. The presence or absence of this spot provides a good character for use in the key. Examination shows the spot is related to the position and structural contact of the vesica against the body wall of the segment, and this differs from species to species.

The key to species of Reuteroscopus is based primarily on male specimens since the genital segment furnishes the most important distinctions between species; however, females may be keyed in the first 12 couplets, or up to the point where the male genital segment must be used for characters. We have placed the key to species after the descriptions, to simplify page reference to the new species.

Reuteroscopus tinctipennis (Knight) n. comb.

1925 Psallus tinctipennis Knight, Can. Ent., 57:89.

On recent examination I find this species belongs in Reuteroscopus. It was described from specimens collected in the Santa Catalina Mts., and Santa Rita Mts., Arizona, August 1924 (A. A. Nichol). Later records: ARIZONA: 2♂♂ July 25, 1925, Tuscon; 6♂♂♀♀ Sept. 9, 1928, Tucson (A. A. Nichol), breeding on Eriogonum sp. ♂ Sept. 22, 1929, Tucson (E. D. Ball). 2♂♂ Sept. 2, 1928, alt. 3300 ft., Rincon Mts. (A. A. Nichol). TEXAS: 5♂♂♀♀ Oct. 5, 1929, Presideo (S. E. Jones).

Reuteroscopus longirostris Knight

1925 Reuteroscopus longirostris Knight, Can. Ent., 57:90.

1964 Reuteroscopus longirostris Kelton, Can. Ent., 96:1422, fig. 6.

This species was described from specimens I collected at Tucson in 1917, and specimens from the Santa Catalina Mts. and Sierrita Mts., 1924, Arizona (A. A. Nichol). I supplied Dr. Kelton with a male paratype which he used for the illustration of the vesica. Somehow, he later added specimen records from Colorado (U. S. N. M. specimens) which I checked and found to be different. This correction seems necessary as Kelton uses the length 3.5 mm for longirostris as a separation point in his key to the species. I have again measured all specimens in the type series and find none of them exceed a length of 3.2 mm.

Reuteroscopus femoralis Kelton

1964 Reuteroscopus femoralis Kelton, Can. Ent., 96:1424, fig. 10.

This species was described from Arizona and from several states in Mexico. We now have identified specimens from TEXAS: College Station, Dimit County, Hidalgo County, also from Presideo and Weslaco, Texas.

Reuteroscopus nigricornis new species

Distinguished from all known species by the uniformly black antennae, but segment I with narrow apex white; genital segment with a prominent black tubercle.

Male. Length 3.7 mm, width 1.4 mm. Head: width .72 mm, vertex .36 mm. Antennal segment I, length .23 mm, black, narrow apex white; II, 1.19 mm, black, thickness just equal to fore tibia; III, .88 mm, black; IV, .37 mm, black. Rostrum, length 1.29 mm, reaching to near apex of hind coxae, yellowish, apex blackish. Pronotum, length .61 mm, width at base 1.12 mm; anterior margin strongly sulcate on middle; greenish yellow, disk fuscous on basal half. Scutellum black, mesoscutum yellowish to fuscous. Hemelytra mostly black, base of corium yellowish to fuscous; embolium and cuneus yellow; membrane dark fuscous, a clear spot by apex of cuneus, veins about the smaller areole, yellow. Pubescence of dorsal surface rubbed off before mounting; probably rather similar to that of ornatus. Legs pallid to dusky, hind femora pale to fuscous, a longitudinal line of small fuscous dots on middle of anterior aspect. Venter greenish yellow, genital segment fuscous to black, yellowish each side before apex; tubercle prominent, black.

Holotype: ♂ September 17, 1957, alt. 5200 ft., Guadalajara, JALISCO, MEXICO (R. and K. Dreisbach); author's collection.

Reuteroscopus fuscatus new species

Distinguished by the uniformly fuscous color combined with pallid antennae; not closely related to any described species but readily separated by the key.

Female. Length 3.2 mm, width 1.8 mm. Head: width .61 mm, vertex .34 mm; fuscous, bucculae pallid. Antennae: segment I, length .20 mm, pale; II, .92 mm, pallid, more slender than fore tibia; III, broken. Rostrum, length 1.22 mm, reaching slightly beyond hind coxae, pallid to fuscous. Pronotum, length .54 mm, width at base 1.03 mm; uniformly fuscous, calli moderately convex. Scutellum and mesoscutum fuscous like the pronotum. Hemelytra uniformly fuscous, cuneus narrowly pale on base and apex. Membrane fuscous, veins and larger areole paler; pale spot by apex of cuneus, and behind that a paler area near margin. Dorsal surface clothed with simple fuscous pubescence and intermixed with patches of appressed, silvery sericeous pubescence. Venter pale fuscous; legs fuscous, tips of trochanters and the tibiae pallid, tibial spines black, without spots at base.

Holotype: ♀ July 12, 1956, Manzanillo, COLIMA, MEXICO (R. and K. Dreisbach); author's collection.

Reuteroscopus basicornis new species

Genital segment without a distinct tubercle, thickness of second antennal segment about equal to fore tibia; distinguished from other species by the black first antennal segment, segment II dusky, black only on base and apex.

Male. Length 2.9 mm, width 1.05 mm. Head: width .61 mm, vertex .32 mm; yellowish to dusky. Antennae: segment I, length .20 mm, black, narrow apex white; II, .85 mm, pallid to dusky, base black, apex fuscous to black, thickness slightly greater than fore tibia; III, .51 mm, black; IV, .24 mm, black. Rostrum, length 1.10 mm, reaching to apex of hind coxae; pallid to pale fuscous, apex blackish. Pronotum, length .48 mm, width at base .98 mm; pale yellowish, clothed with suberect, stiff black hairs, longer before calli and on front of head. Scutellum black, mesoscutum yellowish to blackish. Hemelytra pale yellowish, clavus and apical half of corium dark fuscous to black, much like ornatus; cuneus pallid, yellowish on inner half; membrane dark fuscous, clear spot by apex of cuneus, veins about smaller areole pallid, a pale crescent by margin, extending toward middle; clothed with simple fuscous pubescence, intermixed with patches of silvery sericeous pubescence. Legs pallid, femora with several small fuscous dots on apical half, tarsi fuscous. Venter pallid to yellowish; genital segment with large black spot, off center beneath, without tubercle above.

Holotype: ♂ July 20, 1917, Texas Pass, ARIZONA (H. H. Knight); taken at light; author's collection.

Reuteroscopus pallidiclavus new species

Allied to ornatus Reuter, but differs in absence of black color on scutellum and hemelytra; rostrum reaching slightly beyond apex of hind coxae, and length of second antennal segment not quite equal to width of pronotum at base.

Female. Length 3.6 mm, width 1.36 mm. Head: width .68 mm,

vertex .40 mm; pallid to yellowish. Antennae: segment I, length .25 mm, yellowish; II, 1.09 mm, cylindrical, slightly more slender on basal half, pale to yellowish; III, .91 mm, fuscous; IV, .34 mm. Rostrum, length 1.43 mm, reaching slightly beyond apex of hind coxae, pallid, apex fuscous. Pronotum, length .58 mm, width at base 1.12 mm; pale yellowish, calli scarcely darker. Scutellum and mesoscutum pale to yellowish. Hemelytra pallid translucent, inner apical angles of corium dusky, clavus uniformly pallid, cuneus pale, inner half yellowish; membrane and veins pale fuscous, smaller areole and a small cloud beyond apex of cuneus, slightly darker.

Dorsal surface clothed with rather short pale pubescence, head and margins of pronotum bearing a few erect pale hairs; clavus and corium having some recumbent, slivery sericeous pubescence intermixed with simple hairs. Venter and thorax pallid, in part tinged with yellow. Legs uniformly pallid; femora very clear, bearing very fine, short pale pubescence; tibial spines black but without spots at base.

Holotype: ♀ September 9, 1928, Tuscon, ARIZONA (A. A. Nichol); author's collection. An extra label states "Breeding on Eriogonum sp."

Reuteroscopus abroniae new species

Allied to ornatus Reuter, quite similar in color aspect, but larger; distinguished by having shorter antennae, both sexes having segment II shorter than width of pronotum at base.

Male. Length 4.1 mm, width 1.5 mm. Head: width .71 mm, vertex .37 mm; yellow. Antennae: segment I, length .24 mm, yellow; II, 1.0 mm, yellow, dusky near apex; III, .74 mm, fuscous; IV, .30 mm, fuscous. Rostrum, length 1.56 mm, reaching to posterior trochanters, yellow, apex fuscous. Pronotum, length .64 mm, width at base 1.26 mm, margins of propleura pallid. Scutellum fuscous, mesoscutum yellowish to fuscous. Hemelytra yellow, clavus and apical one-third of corium blackish; membrane fuscous, spot by apex of cuneus pale, a small pale cloud beyond, near margin.

Dorsal surface clothed with yellowish to golden, recumbent simple pubescence, intermixed on clavus and corium with more appressed, sericeous silvery pubescence; head and pronotum bearing some erect, brown to golden hairs. Venter and thorax yellow, genital segment with a black patch on ventral surface, more to the right side. Legs yellow, femora slightly dusky, hind pair with a double row of pale fuscous spots, distinctness varies with angle of view; tibial spines blackish but without spots at base.

Female. Length 5.0 mm, width 1.5 mm. Head: width .71 mm, vertex .40 mm. Antennae: segment I, length .25 mm; II, 1.05 mm; III, .71 mm; IV, .34 mm. Rostrum, length 1.56 mm, reaching to base of hind trochanters. Pronotum, length .64 mm, width at base 1.29 mm. Slightly more robust than the male but very similar in pubescence and coloration.

Holotype: ♂ August 25, 1925, Hudson, COLORADO (H. H. Knight); author's collection. Allotype: ♀, same data as the type. Paratypes: 15♂♂, 3♀♀, collected with the types on Abronia elliptica (H. H. Knight). NEBRASKA: ♂ August 26, 1925, Big Spring (H. H. Knight). COLORADO: ♂ August 14, 1960, near Fort Collins, Watrous Park, Cache La Poudre Canyon (R. and K. Dreisbach). ♂, ♀, August 25, 1925, Hudson (C. J. Drake). TEXAS: ♀ September 28, 1930, Amarillo (S. E. Jones).

Reuteroscopus carolinae new species

Allied to ornatus Reuter, but size larger; second antennal segment longer, length (♂) distinctly greater than basal width of pronotum, in female slightly less; male genital segment with large, fat, prominent tubercle.

Male. Length 3.7 mm, width 1.36 mm. Head: width .71 mm, vertex .37 mm. Antennae: segment I, length .22 mm; II, 1.26 mm, more slender on basal half, apical part slightly thicker than basal half of fore tibia, pale yellowish; III, .98 mm, fuscous; IV, .47 mm, fuscous. Rostrum, length 1.32 mm, reaching upon apex of hind coxae, yellowish, apex blackish. Pronotum, length .64 mm, width at base 1.15 mm; yellow, basal half more green; disk and margins bearing prominent, erect, brownish black to black hairs. Scutellum fuscous to black; mesoscutum yellowish, shaded with fuscous. Hemelytra black, basal two-thirds of corium and embolium, and the cuneus, yellow. Membrane dark fuscous, a clear spot by apex of cuneus, apical half of membrane with indistinct marginal pale spot; veins about the smaller areole, pale. Dorsum clothed with fuscous to black simple hairs, intermixed with spots and patches of more appressed, sericeous silvery pubescence. Legs pale to yellowish, hind femora showing fuscous spots under certain angles of illumination. Venter pale yellow, genital segment more greenish yellow, ventral surface with black spot; genital segment with prominent strong tubercle above.

Female. Length 3.9 mm, width 1.5 mm. Head: width .71 mm, vertex .41 mm; yellow. Antennae: segment I, length .23 mm; II, 1.20 mm, slender, thickness at apex scarcely equal to thickness of fore tibia, pallid; III, .98 mm, fuscous; IV, broken. Rostrum, length 1.4 mm, reaching to apex of hind coxae. Pronotum, length .64 mm, width at base 1.26 mm. More robust than the male but pubescence and coloration very similar.

Holotype: ♂ September 2, 1926, Salisbury, NORTH CAROLINA (H. H. Knight); author's collection. Allotype: ♀, taken with the type. Paratypes: 1♂, 1♀, taken with the types.

Reuteroscopus santaritae new species

Allied to longirostris Knight, but distinguished by the bright yellow color, the clavus and a patch on corium pale fuscous; second antennal segment fuscous on apical one-third; and by the sparsely set sericeous pubescence.

Male. Length 3.4 mm, width 1.2 mm. Head: width .64 mm, vertex .34 mm; yellow. Antennae: segment I, length .20 mm, yellow; II, 1.10 mm, nearly cylindrical, slightly more slender near base, pale yellowish, apical one-third infuscated; III, .85 mm, black; IV, .40 mm, black. Rostrum, length 1.26 mm, reaching behind posterior coxae and to middle of trochanters, yellow, apex black. Pronotum, length .50 mm, width at base 1.02 mm, wider at base and more flat on disk than longirostris; yellow, calli deeper yellow. Scutellum and mesoscutum pale fuscous, apex pale. Hemelytra yellow, clavus and a large spot on inner apical angle of corium pale fuscous, subtranslucent; cuneus uniformly yellow. Membrane fuscous, slightly darker within smaller areole, also a large spot beyond apex of cuneus; a clear spot by apex of cuneus, as wide as

smaller areole, veins yellow, fuscous on brachium along side of areole.

Dorsal surface clothed with recumbent and suberect, simple yellowish pubescence, and sparsely intermixed with appressed sericeous silvery hairs. Venter and thorax pale yellow, deeper yellow on propleura and sternum; with long pale hairs on dorsal surface each side of the genital cavity. Legs pale to yellowish, femora with short pale pubescence, face of hind femur with a row of seven small fuscous dots along dorsal edge; tibiae pallid, spines black, apical tarsal segment fuscous. Genital segment without a tubercle but with a slight swelling at top on left side of cavity; a large fuscous spot beneath, before apex of segment.

Holotype: ♂ September 26, 1925, Santa Rita Mts., ARIZONA (A. A. Nichol); author's collection. Paratype: ♂ October 10, 1925, Santa Rita Mts., Arizona (C. T. Vorhies).

Reuteroscopus dreisbachi new species

Allied to ornatus Reuter, but second antennal segment longer, length distinctly greater than basal width of pronotum; apical area of corium with black, but it does not extend across the radial vein; genital segment with well-developed tubercle and ventral surface with a prominent black spot.

Male. Length 3.6 mm, width 1.25 mm. Head: width .68 mm, vertex .34 mm; deep yellow. Antennae: segment I, length .20 mm, pale; II, 1.19 mm, thickness equal to fore tibia, pallid, apical area more dusky; III, .98 mm, fuscous; IV, .44 mm, fuscous. Rostrum, length 1.39 mm, reaching upon apex of hind coxae, yellowish, apex blackish. Pronotum, length .55 mm, width at base 1.05 mm; greenish yellow, embolium and cuneus more pallid; clavus except base, brownish black; corium with black spot on apical area, but it does not extend across the radial vein. Membrane dark fuscous, with clear spot by apex of cuneus; veins about smaller areole, yellow.

Clothed with pale to golden simple pubescence, corium and clavus with brown to black hairs, intermixed with patches and spots of silvery sericeous pubescence. Legs pallid to yellowish, with fuscous pubescence but devoid of dark spots, tarsi fuscous. Venter pallid to greenish and yellow, genital segment with prominent, elongated black mark; tubercle area much swollen, but tubercle does not protrude strongly as in ornatus.

Female. Length 3.7 mm, width 1.5 mm. Head: width .71 mm, vertex .40 mm. Antennae: segment I, length .21 mm; II, 1.10 mm, more slender than in the male, not equal to thickness of fore tibia, pallid; III, .95 mm, fuscous; IV, .42 mm, fuscous. Rostrum reaching upon hind coxae. Pronotum, length .58 mm, width at base 1.15 mm. More robust than the male but very similar in color and pubescence. Color paler, the light colored areas of hemelytra, pallid and subtranslucent.

Holotype: ♂ October 20, 1957, Cuernavaca, MORELOS, MEXICO (R. and K. Dreisbach); author's collection. Allotype: ♀, same data as the type. Paratypes: ♀ August 8, 1955, Douglas; ♀ August 5, 1955, San simon, ARIZONA (R. R. Dreisbach). ♀ August 9, 1964, Tombstone (5 mi. s.), ARIZONA (H. R. Burke). It is a pleasure to dedicate this species to the collector, Robert R. Dreisbach, whom we regret to report died in June, 1964. For many years Mr. Dreisbach was active in preparing a state list of insects for Michigan, and we named boxes of Miridae for

him on several occasions. He collected insects in Mexico during 1956, 1957, and 1961, and sent the writer Miridae for identification and publication, with permission to retain specimens important for my work.

Reuteroscopus schaffneri new species

Color pattern suggestive of ornatus Reuter; genital segment with slightly irregular dorsal margin, but nor raised or swollen into a definite tubercle; length of antennal segment II greater than basal width of pronotum; color pattern black on a pallid ground color.

Male. Length 3.3 mm, width 1.3 mm. Head: width .68 mm, vertex .33 mm. Antennae: segment I, length .24 mm, pallid; II, 1.09 mm, thickness equal to or slightly greater than thickness of fore tibia, pallid; III, .82 mm, black; IV, .41 mm, black. Rostrum, length 1.4 mm, reaching slightly beyond apices of hind coxae, or upon the trochanters, pale, apex blackish. Pronotum, length .92 mm, width at base 1.02 mm; pallid, calli more yellow. Scutellum black, narrowly pale along claval suture; corium black on apical one-third, also basal angle of paracuneus black; cuneus pale yellow on disk. Membrane dark fuscous to blackish, veins pallid, with the usual clear spot by apex of cuneus, also with a paler marginal spot on apical half. Ventral surface and legs pallid, femora without spots, apical half of tarsi fuscous, tibial spines black.

Dorsal surface clothed with pale and some fuscous simple pubescence, intermixed with small patches of more appressed, sericeous silvery pubescence. Venter pallid to pale yellowish; genital segment having an elongate fuscous spot beneath, placed slightly to right side of median line; without dorsal tubercle, left marginal edge of cavity, slightly irregular but without distinct tubercle.

Female. Length 3.4 mm, width 1.3 mm. Head: width .64 mm, vertex .34 mm. Antennae: segment II, length 1.10 mm, slightly more slender than thickness of fore tibia, pallid; II and IV, black. Rostrum reaching slightly behind posterior coxae. Pronotum, length .58 mm, width at base 1.09mm. Slightly more robust but pubescence and coloration very similar to the male.

Holotype: ♂ May 21, 1964, Bastrop, TEXAS (Joe C. Schaffner); author's collection. Allotype: same data as the type. Paratypes: 11 ♂♂, 21♀♀, taken at lights along with the types. TEXAS: 2♂♂ May 5, 1928, ♂ May 9, 1929, College Station (H.G. Johnston). ♂ May 20, 1930, Weslaco (J.C. Gaines). ♂ May 26, 1930, Hidalgo County (J.C. Gaines).

Named in honor of the collector, Dr. Joseph C. Schaffner, my last major student in Entomology at Iowa State University; a good authority of Coreidae and coming student of family Miridae.

Reuteroscopus brevis new species

Related to uvidus (Dist.) but with second antennal segment equal in thickness to the fore tibia; genital segment without tubercle, and no sign of a black spot on ventral surface.

Male. Length 3.0 mm, width 1.10 mm. Head: width .58 mm, vertex .27 mm. Antennae: segment I, length .17 mm, dusky yellow; II, .88 mm, thickness equal to basal thickness of fore tibia, pallid to dusky on apical half; III, .68 mm, fuscous; IV, .44 mm, fuscous. Rostrum, length 1.10 mm, reaching to apex of hind coxae, yellowish, apex blackish.

Pronotum, length .47 mm, width at base .88 mm; greenish yellow. Scutellum and mesoscutum fuscous. Hemelytra pale to yellowish, subtranslucent; clavus fuscous, paler bordering corium; corium fuscous on apical one-third, infuscation crosses radial vein to near the embolium. Membrane pale fuscous, smaller areole darker, veins pale; clear spot by apex of cuneus, and a faint pale spot each side of apical half. Legs pale to yellowish, a row of small fuscous dots visible on midline of hind femora. Venter pale to greenish; genital segment without tubercle; also without dark spot on ventral surface.

Holotype: ♂ October 23, 1957, Acayucan, VERACRUZ, MEXICO (R. and K. Dreisbach); author's collection. Paratypes: 3♂♂, collected with the type.

Reuteroscopus oaxacae new species

Allied to ornatus Reuter, but length of second antennal segment distinctly greater than basal width of pronotum; tubercle on genital segment nearly flat, poorly developed.

Male. Length 3.6 mm, width 1.2 mm. Head: width .70 mm, vertex .34 mm. Antennae: segment I, length .20 mm, yellowish; II, 1.15 mm, pallid to pale fuscous, thickness slightly greater than the fore tibia; III, .88 mm, fuscous; IV, .44 mm, fuscous. Rostrum, length 1.19 mm, reaching to near apex of hind coxae, yellowish, apex blackish. Pronotum, length .56 mm, width at base 1.02 mm; greenish yellow, pubescence yellowish, a few odd fuscous hairs intermixed. Scutellum fuscous, mesoscutum yellowish to fuscous. Hemelytra greenish yellow; clavus fuscous outer margin pale except near apex; apical one-third of corium fuscous, embolium and cuneus yellowish. Membrane fuscous, a clear spot by apex of cuneus, veins yellowish about smaller areole. Clothed with pale to yellowish simple pubescence, hairs brownish on fuscous areas, intermixed with silvery to golden sericeous pubescence. Legs pallid to yellowish, hind femora with fuscous dots on midline of anterior face, a few secondary dots on apical one-third, also on posterior aspect; tarsi pale fuscous. Venter pale to yellowish, genital segment with blackish spot beneath; tubercle rather small and poorly developed, yet arises to a distinct crest.

Holotype: ♂ December 22, 1955, Tapanatepec (3 mi. n.), OAXACA, MEXICO (Joe C. Schaffner); author's collection. Paratypes: 2♂♂, collected with the type.

Reuteroscopus luteus new species

Distinguished by the unusually bright golden yellow color; dorsum with dark color pattern suggestive of ornatus Reut., but genital segment without a dorsal tubercle, ventral surface with an elongated black spot.

Male. Length 2.9 mm, width 1.15 mm. Head: width .61 mm, vertex .36 mm. Antennae: segment I, length .20 mm; II, .98 mm, thickness equal to that of fore tibia on basal half, pallid to dusky yellow, or yellowish brown in certain light angles; III, .74 mm, fuscous brown; IV, .40 mm, fuscous. Rostrum, length 1.39 mm, reaching upon seventh ventral segment, orange yellow, apex blackish. Pronotum, length .54 mm, width at base .95 mm, golden yellow, disk sparsely set with suberect fuscous bristles. Scutellum fuscous brown, mesoscutum more yellowish. Heme-

lytra golden yellow, clavus fuscous brown, apical area of corium with a fuscous spot but not large enough to cross the radial vein; membrane fuscous, spot by apex of cuneus, and a submarginal spot beyond, pale to clear, veins about the smaller areole yellow. Clothed with yellowish to golden brown simple pubescence and intermixed on dorsum with more recumbent, sericeous silvery pubescence. Legs uniformly golden yellow, apical half of tarsi fuscous, femora with no indication of spots. Venter pale yellowish, genital segment golden yellow, ventral surface with a prominent fuscous spot. Genital segment without indication of any type of tubercle.

Female. Length 3.2 mm, width 1.3 mm. Head: width .62 mm, vertex .39 mm. Antennae: segment I, length .22 mm, yellow; II, 1.0 mm, more slender than the male; III, .82 mm; IV, .44 mm. Rostrum, length 1.56 mm, reaching to base of ovipositor. Pronotum, length .54 mm, width at base 1.0 mm. More robust than the male but very similar in color and pubescence.

Holotype: ♂ November 20, 1955, Teguila (10 mi. S.E.), JALISCO, MEXICO (Joe C. Schaffner); author's collection. Allotype: ♀, same data as the type. Paratypes: 7♀♀, taken with the types.

Reuteroscopus mexicanus Kelton

1964, Can. Ent., 96:1428, fig. 15.

Allied to luteus but distinguished by the small, sharp, erect tubercle at middle of left dorsal wall bordering genital cavity; color more greenish yellow than golden; male paratypes at hand for this redescription and comparison with related species.

Male. Length 2.8 mm, width 1.15 mm. Head: width .61 mm, vertex .37 mm. Antennae: segment I, length .20 mm, pale yellowish, two black bristles on dorsal aspect; II, .98 mm, more slender at base, thickness on apical fourth slightly exceeding thickness of fore tibia; pallid to yellowish; III, broken. Rostrum, length 1.3 mm, reaching upon eighth ventral segment or to base of genital segment, yellowish, apex black. Pronotum, length .51 mm, width at base .98 mm; yellow, basal half of disk more greenish. Scutellum fuscous, mesoscutum more yellowish. Hemelytra greenish yellow to yellow, clavus and patch on apical third of corium, dark fuscous to brownish, the dark area crossing radial vein slightly. Membrane uniformly fuscous, a clear spot by apex of cuneus, and pale submarginal spot at middle of apical half; veins about smaller areole pale. Dorsal surface clothed with pale yellowish to golden brown simple pubescence, intermixed with more appressed, sericeous silvery pubescence. Thorax and legs uniformly greenish yellow, apical half of tarsi fuscous, tibial spines black. Venter greenish yellow, genital segment with small, distinct, erect tubercle above, at middle of left margin of genital cavity.

Specimens examined: paratype, ♂ Aug. 25, 1938, Acapulco, GUERRERO, MEXICO (L.J. Lipovsky). MEXICO: ♂ July 15, 1961, Tequesquitengo, MORELOS (R. and K. Dreisbach). ♂ Aug. 20, 1964, Acaponeta (15 mi. S.) NAYARIT (H.R. Burke). ♂ Nov. 20, 1955, Tequila, JALISCO (Joe C. Schaffner).

Working from Kelton's key, I thought this must be a different species; but later when I received a paratype, I found it also had the small, sharp, erect tubercle which was not mentioned in the original description of

mexicanus Kelton. Two species could be involved here but I am accepting the paratype as identical with the holotype of mexicanus Kelton.

Reuteroscopus croceus new species

Distinguished from all known species of the genus by the uniform lemon yellow color, devoid of any color pattern or shading of fuscous, except on the wing membrane.

Female. Length 3.33 mm, width 1.3 mm. Head: width .60 mm, vertex .38 mm; yellow. Antennae: segment I, length .20 mm, yellow; II, 1.02 mm, yellow, slender, cylindrical, thickness distinctly less than the fore tibia; III, broken. Rostrum, length 1.49 mm, reaching behind posterior coxae to near base of ovipositor, yellow, apex blackish. Pronotum, length .51 mm, width at base .99 mm. Scutellum and mesoscutum yellow. Hemelytra, except membrane, uniformly lemon yellow. Membrane fuscous, a clear spot by apex of cuneus, also with marginal pale spot at middle of apical half, veins yellow. Dorsum clothed with suberect, simple, golden to fuscous hairs, longer and more prominent on pronotal disk and base of hemelytra, intermixed with more appressed, sparsely grouped, silvery sericeous pubescence. Ventral surface and legs uniformly yellow, claw segment of tarsi fuscous.

Holotype: ♀ August 1-6, 1961, Veracruz, VERACRUZ, MEXICO (R. and K. Dreisbach); author's collection.

Reuteroscopus brevicornis new species

Belongs in the group with color pattern diffuse; distinguished from related species by the short second antennal segment, and rostrum reaching upon genital segment.

Male. Length 3.4 mm, width 1.2 mm. Head: width .58 mm, vertex .34 mm; yellow. Antennae: segment I, length .24 mm, yellow; II, .75 mm, yellow, cylindrical, slightly more slender than fore tibia; III, broken. Rostrum, length 1.63 mm, reaching upon base of genital segment, yellow, apex blackish. Pronotum, length .51 mm, width at base 1.03 mm, greenish yellow, calli more yellow. Scutellum fuscous, mesoscutum dusky yellow. Hemelytra greenish yellow, shaded from dusky to fuscous; clavus fuscous, apical area of corium and bordering clavus, dusky to fuscous; all fuscous areas not clear-cut on edges, but shading gradually from dusky to fuscous. Membrane fuscous, veins yellow; a clear spot by apex of cuneus, a paler submarginal spot at middle of apical half. Dorsal surface clothed with pale to dusky, suberect, simple pubescence, intermixed on clavus and corium with more appressed, silvery sericeous pubescence. Ventral surface and legs greenish yellow, apical half of tarsi fuscous. Genital segment greenish to yellow, no indication of a fuscous spot on ventral surface.

Holotype: ♂ July 15, 1961, Tequesquitengo, MORELOS, MEXICO (R. and K. Dreisbach); author's collection.

Reuteroscopus grandis new species

Belongs in the group with diffuse color pattern; distinguished from related species by the shorter second antennal segment which is not equal to basal width of pronotum; rostrum just reaching upon posterior trochanters.

Male. Length 4.0 mm, width 1.6 mm. Head: width .69 mm, vertex .37 mm; yellow. Antennae: segment I, length .26 mm, yellowish; II, 1.22 mm, subcylindrical, more slender near base, yellowish; greatest thickness not equal to that of fore tibia; III, .85 mm, fuscous; IV, .44 mm, fuscous. Rostrum, length 1.77 mm, just reaching upon posterior trochanters, yellow, apex blackish. Pronotum, length .72 mm, width at base 1.29 mm; greenish to yellowish, calli yellow. Scutellum fuscous, mesoscutum yellowish to fuscous. Hemelytra greenish yellow to dusky and fuscous; clavus and inner half of corium fuscous, edges shading to dusky, no sharp color margins between yellowish, dusky and fuscous colors. Membrane fuscous, veins yellowish; a clear spot by apex of cuneus, submarginal spot indistinct, scarcely visible. Dorsal surface clothed with suberect, golden to brown simple pubescence, more prominent on pronotum, intermixed with patches and spots of more appressed, silvery, sericeous pubescence. Ventral surface and legs pale to medium yellow, hind femora with longitudinal series of dots and evanescent fuscous spots; tips of tarsi fuscous. Genital segment yellowish to dusky yellow, ventral surface with a short dark line leading into a wider dusky to fuscous area, the spot poorly defined.

Female. Length 4.7 mm, width 1.8 mm. Head: width .75 mm, vertex .51 mm; yellow. Antennae: segment I, length .25 mm, yellow; II, 1.38 mm, cylindrical, more slender near base, yellow, thickness near apex less than thickness of fore tibia at middle; III, .85 mm, fuscous; IV, .44 mm, fuscous. Pronotum, length .78 mm, width at base 1.43 mm. More robust than the male but very similar in color and pubescence.

Holotype: ♂ September 17, 1957, Kilo 78, on Route 15, NAYARIT, MEXICO (R. and K. Dreisbach); author's collection. Allotype: ♀ Sept. 17, 1957, Kilo 90, Route 15, NAYARIT, MEXICO (R. and K. Dreisbach).

Reuteroscopus gracilicornis new species

Allied to grandis, having a diffuse color pattern, but distinguished by the more slender antennae and smaller size; genital segment without tubercle or fuscous spot.

Male. Length 3.5 mm, width 1.5 mm. Head: width .61 mm, vertex .34 mm; yellow. Antennae: segment I, length .20 mm, yellow; II, 1.1 mm, slender, thickness not equal to that of fore tibia, yellow; III, .88 mm, fuscous; IV, .54 mm, fuscous. Rostrum, length 1.6 mm, reaching upon sixth ventral segment, yellow, apex blackish. Pronotum, length .58 mm, width at base 1.15 mm, yellow, basal half greenish yellow. Scutellum fuscous, mesoscutum dusky yellow. Hemelytra greenish yellow, clavus fuscous, inner apical half of corium dusky to fuscous; edges of infuscation shading to dusky and yellow, no sharp color margins between yellow and fuscous. Membrane fuscous, veins yellowish; a clear spot by apex of cuneus, submarginal spot obsolete. Pubescence badly rubbed, but apparently is very similar to that of grandis. Ventral surface and legs, yellow, femora with fuscous pubescence; genital segment uniformly yellow, without tubercle or fuscous spot.

Holotype: ♂ September 16, 1957, Campostella, NAYARIT, MEXICO (R. and K. Dreisbach); author's collection.

Reuteroscopus cuernavacae new species

Runs in the key to couplet with antennatus Kelton, but size smaller, and second antennal segment shorter; genital segment with a distinct tubercle.

Male. Length 3.5 mm, width 1.3 mm. Head: width .60 mm, vertex .34 mm; greenish yellow. Antennae: segment I, length .20 mm, dusky yellow; II, 1.1 mm, pale yellowish, apex dusky, cylindrical, thickness equal to that of fore tibia; III, .88 mm, black; IV, .44 mm, black. Rostrum, length 1.3 mm, reaching upon hind coxae, yellow, apex blackish. Pronotum, length .51 mm, width at base 1.02 mm; greenish yellow. Scutellum fuscous, paler on median line, mesoscutum dusky yellow. Hemelytra greenish yellow, clavus fuscous, paler at base and along claval suture; inner apical angle of corium fuscous, edges becoming dusky and merging gradually with the yellow. Membrane and cubitus fuscous, smaller areole darker, a dusky spot on edge of cuneus, veins about the areole, yellowish. Dorsal surface clothed with suberect, pale to fuscous simple hairs, a few stronger black hairs intermixed; also bearing more appressed silvery sericeous pubescence. Ventral surface greenish yellow, legs pale yellowish, femora with fuscous pubescence, a few minute fuscous dots on apical area. Genital segment with a dorsal tubercle, rather flat but distinct; yellowish, ventral surface with a large, elongated black spot.

Holotype: ♂ October 20, 1957, Cuernavaca, MORELOS, MEXICO (R. and K. Dreisbach); author's collection.

Reuteroscopus brevirostris new species

Belongs in the group with diffuse color pattern; distinguished from related species by the shorter rostrum, just reaching upon posterior trochanters, and second antennal segment just equal to basal width of pronotum.

Male. Length 3.9 mm, width 1.5 mm. Head: width .64 mm, vertex .36 mm; yellow. Antennae: segment I, length .22 mm, yellow; II, 1.15 mm, dusky yellow, cylindrical, thickness just equal to that of fore tibia; III, .78 mm, fuscous; IV, .41 mm, fuscous. Rostrum, length 1.60 mm, pale yellowish, apex blackish, just reaching upon posterior trochanters. Pronotum, length .68 mm, width at base 1.15 mm, greenish yellow, calli yellow. Scutellum fuscous, mesoscutum dusky yellow to fuscous. Hemelytra pale yellowish to dusky, corium more fuscous, darker on apical area; clavus fuscous, paler near base; cuneus pale yellowish, paracuneus fuscous. Membrane fuscous, with a brownish tint, veins about smaller areole pale; a clear spot bordering apex of cuneus, a very faint submarginal spot at middle of apical half.

Dorsal surface clothed with suberect, simple, yellowish to fuscous hairs, becoming golden brown over fuscous areas, intermixed with irregular patches of more appressed, sericeous silvery pubescence. Ventral surface and legs pale yellow to dusky yellow; hind femora dusky yellow, without spots, tips of tarsi fuscous. Genital segment dusky yellow, without a definite fuscous spot, but two slender brown lines show through the integument, indicating structural parts of the vesica.

Holotype: ♂ July 5, 1956, Bella Vista, NAYARIT, MEXICO (R. and K. Dreisbach); author's collection.

Reuteroscopus burkei new species

Belongs in the group with diffuse color pattern; allied to brevirostris but rostrum reaching to base of genital segment; ventral surface of genital segment without a black spot.

Male. Length 3.1 mm, width 1.2 mm. Head: width .63 mm, vertex .34 mm; yellow. Antennae: segment I, length .20 mm, yellow; II, 1.02 mm, yellowish, cylindrical, slightly more slender toward base, thickness near apex equal to thickness of fore tibia near base; III, .74 mm, fuscous; IV, .40 mm, fuscous. Rostrum, length 1.42 mm, reaching upon base of genital segment, pale yellowish, apex blackish. Pronotum, length .54 mm, width at base 1.02 mm; greenish yellow, calli and anterior margin yellow. Scutellum fuscous over yellow, mesoscutum paler. Hemelytra greenish yellow to dusky yellow; clavus dusky yellow to fuscous, corium more fuscous on apical area, the dusky areas change gradually to deeper fuscous; cuneus yellowish to dusky yellow to fuscous on paracuneus. Membrane pale fuscous, veins yellow, a clear spot by apex of cuneus, a paler submarginal spot barely visible on apical half. Ventral surface and legs pale yellowish to yellow; femora scarcely darker, without spots or dots. Genital segment yellowish, without darker spot on ventral surface.

Holotype: ♂ August 20, 1964, Acaponita (15 mi. S.) NAYARIT, MEXICO (H.R. Burke). Named in honor of the collector, Dr. H.R. Burke of Texas A. and M. University.

Reuteroscopus immaculatus new species

Belongs in the group with diffuse color pattern; allied to burkei but differs in the more slender second antennal segment, thickness not equal to that of fore tibia; rostrum longer, reaching to middle of genital segment; genital segment greenish yellow, immaculate, without a black spot beneath.

Male. Length 3.3 mm, width 1.3 mm. Head: width .60 mm, vertex .34 mm. Antennae: segment I, length .22 mm, yellow; II, 1.0 mm, yellow, cylindrical, slender, not quite equal to thickness of fore tibia; III, broken. Rostrum, length 1.6 mm, reaching to middle of genital segment, yellowish, apex blackish. Pronotum, length .51 mm, width at base 1.0 mm; greenish yellow. Scutellum fuscous, mesoscutum yellowish to dusky. Hemelytra greenish yellow, shaded from dusky to fuscous, clavus and inner half of corium more nearly fuscous, gradually shading from yellowish to dusky to fuscous; cuneus subtranslucent, pale to yellowish. Membrane fuscous, veins about smaller areole yellow, a clear spot by apex of cuneus, a slightly pale submarginal spot at middle of apical half. Ventral surface and legs pale yellowish to yellow; hind femora deeper yellow on apical half, but without fuscous dots or spots. Genital segment pale yellow to greenish yellow, without fuscous spot on ventral surface.

Holotype: ♂ July 13, 1961, alt. 4000 ft., Xochicalco, MORELOS, MEXICO (R. and K. Dreisbach); author's collection.

Reuteroscopus obscurus new species

Runs in the key near antennatus Kel. but differs in the smaller size, second antennal segment shorter; having an obscure fuscous spot on ventral surface of male genital segment.

Male. Length 3.9 mm, width 1.4 mm. Head: width .64 mm, vertex .36 mm; yellow. Antennae: segment I, length .22 mm, yellow; II, 1.16 mm, subcylindrical, more slender on basal half, yellowish to dusky; III, .81 mm, fuscous; IV, .44 mm, fuscous. Rostrum, length 1.7 mm, reaching upon base of genital segment, yellow, apex fuscous. Pronotum, length .61 mm, width at base 1.10 mm; greenish yellow, calli and anterior margin clear yellow. Scutellum fuscous, mesoscutum dusky yellow. Hemelytra clear yellow to dusky, clavus fuscous, inner apical half of corium dusky to fuscous, the dusky shade fading gradually into yellow; cuneus uniformly yellow. Membrane and cubitus fuscous, clear spot by apex of cuneus, veins about smaller areole yellow, a very obscure, paler submarginal crescent near middle of apical half. Dorsal surface with pale to dusky simple pubescence, intermixed on hemelytra with some paler sericeous pubescence; cuneus set with several suberect fuscous hairs. Ventral surface yellowish, venter greenish yellow; legs yellow, tibial spines black. Genital segment with an obscure fuscous spot beneath, without dorsal tubercle.

Holotype: ♂ July 10, 1956, El Molino, JALISCO, MEXICO (R. and K. Dreisbach); author's collection.

Reuteroscopus medius new species

Runs in the couplet with immaculatus but size larger; rostrum somewhat shorter, just reaching to base of genital segment; genital segment without tubercle, yellow, without a fuscous spot on ventral surface.

Male. Length 3.9 mm, width 1.4 mm. Head: width .68 mm, vertex .34 mm, yellow. Antennae: segment I, length .23 mm, yellow; II, 1.15 mm, just equal to basal width of pronotum, cylindrical, yellow; III, .85 mm, fuscous; IV, .41 mm, fuscous. Rostrum, length 1.76 mm, reaching to base of genital segment, yellow, apex fuscous. Pronotum, length .64 mm, width at base 1.15 mm, greenish yellow, calli deep yellow. Scutellum fuscous over yellow, mesoscutum dusky yellow. Hemelytra yellow to dusky yellow, clavus and apical half of corium dusky yellow to fuscous, the color change is very gradual, without lines of demarcation; cuneus dusky yellow. Membrane and cubitus fuscous, a clear spot by apex of cuneus, veins about smaller areole pale; an obscure pale crescent extends from margin to middle, at middle of apical half. Dorsal surface with simple, suberect, yellowish to golden brown pubescence, sparsely intermixed with more appressed, silvery sericeous pubescence. Legs pale yellowish, femora with fine dusky pubescence, tibial spines black. Ventral surface and venter, uniformly yellowish; genital segment without tubercle or fuscous spot.

Holotype: ♂ September 17, 1957, Kilo 78 on Route 15, NAYARIT, MEXICO (R. and K. Dreisbach); author's collection.

Key to species of Reuteroscopus Kirk., in part for males only

1. Pronotum and hemelytra pale fuscous, tinted with pink, calli black. . . . . tinctipennis Kngt.
   Pronotum and hemelytra colored otherwise. 2

2. Cuneus reddish black; head and dorsal surface black, or reddish black; length 3.5 mm. . . . . nicholi Kngt.
   Cuneus pale or yellowish, sometimes fuscous but not reddish black. 3

3. Head, thorax, hind femora and hemelytra, uniformly fuscous; antennae pallid; length 3.2 mm. . . . . fuscatus Kngt.
   Color combination otherwise. 4

4. Antennal segments I and II brown, fuscous or black. 5
   Antennal segments I and II pale or yellowish, not distinctly brown, dark fuscous or black; sometimes dusky, but more pallid than fuscous. 9

5. Antennae uniformly black, segment I with narrow apex white; male genital segment with prominent black tubercle; length 3.7 mm. . . . . nigricornis Kngt.
   Antennae not uniformly black, segment II brownish, or black only at base; genital segment without black tubercle. 6

6. Antennal segment II brown or fuscous brown, not black at base and paler on middle. 7
   Antennal segment II black at base, yellowish or dusky on middle, apex darker. 8

7. Antennal segment II in length slightly exceeding basal width of pronotum; male genital segment with tubercle on dorsal margin but not as large as in ornatus; length 3.5 mm. . . . . diffusus Kelton
   Antennal segment II in length not equal to basal width of pronotum; male genital segment without dorsal tubercle; length 3.5—3.9 mm. . . . . froeschneri Kngt.

8. Rostrum reaching beyond hind coxae, or upon fifth ventral segment; length 3.5—4.1 mm. . . . . aztecus Kelton
   Rostrum reaching only to apex of hind coxae; length 2.9 mm. . . . . basicornis Kngt.

9. Hind femora reddish brown or fuscous to blackish on apical half. 10
   Hind femora pallid to yellowish, sometimes with small dots or spots, but not strongly shaded with dark color. 11

10. Femora reddish brown on apical half, apices with reddish tint; male genital segment without tubercle; length 2.5—2.9 mm. . . . . femoralis Kelton

Hind femora fuscous on apical half, without reddish tint; male genital segment without tubercle; length 2.7—2.9 mm. . . . . hamatus Kelton

11. Clavus and corium pallid, subtranslucent, only a touch of dusky shading on inner apical angle of corium; length of antennal segment II scarcely equal to width of pronotum at base; length 3.7 mm. . . . . pallidiclavus Kngt
Clavus and corium if pallid, shaded in part with fuscous or black. 12

12. Dorsal color pattern with definite margins, clear-cut as in ornatus. 13
Dorsal color pattern diffuse, or absent, edges of dark color not clear-cut as in ornatus. 29

13. Male genital segment with a definite or strong dorsal tubercle. 14
Male genital segment may have an irregular dorsal margin, but not raised or swollen into a definite tubercle. 20

14. Length of antennal segment II, approximately equal to basal width of pronotum. 15
Length of antennal segment II, distinctly greater than basal width of pronotum. 16

15. Genital segment with large, distinct tubercle, rostrum just reaching upon apex of hind coxae; length [illegible] mm. . ornatus Reut
Genital segment with a small erect tubercle halfway along left margin of genital cavity; rostrum reaching upon eighth ventral segment; length 2.6 mm. . . . . mexicanus Kelton

16. Corium with apical half black and extending widely across radial vein. 17
Corium with small fuscous or black spot on apical area which does not cross the radial vein. 18

17. Genital tubercle large, fat, prominent; right clasper broad, dorsal margin tapers from middle direct to apex; ground color deep yellow, basal half of pronotum green; length 3.7 mm. . . . . carolinae Kngt
Genital tubercle nearly flat, poorly developed; right clasper more strap-like; ground color pale to yellowish; length 3.6 mm. . . . . oaxacae Kngt

18. Color deep yellow, clavus and spot on corium pale fuscous; rostrum reaching to seventh ventral segment; length 3.4 mm. . . . . santaritae Kngt
Color pale to greenish yellow, clavus and corium spot, black. 19

19. Rostrum reaching to base of genital segment; length 2.9—3.0 mm. . . . . digitatus Kelton

Rostrum shorter, only reaching upon posterior trochanters; larger, length 3.6 mm. . . . . dreisbachi Kngt.

20.(13) Corium broadly infuscated, dark color extending across radial vein to near embolium. 21
Corium with dark spot on spical area, but the dark color not extending across the radial vein. 25

21. Rostrum long, reaching upon genital segment, length more than 1.5 times width of pronotum at base; length 3.4 mm. . . . . complexus Kelton
Rostrum shorter, not reaching upon genital segment. 22

22. Antennal segment II thick as the fore tibia. 23
Antennal segment II more slender than fore tibia; length 3.5—3.6 mm. . . . . uvidus (Dist.)

23. Male genital segment with blackish spot on ventral surface. . 24
Male genital segment without a black spot on ventral surface; length 3.8 mm. . . . . brevis Kngt.

24. Length of antennal segment II not equal to basal width of pronotum; rostrum just reaching upon hind coxae; length 3.7 mm. . . . . abroniae Kngt.
Length of antennal segment II slightly greater than basal width of pronotum; rostrum reaching upon posterior trochanters; color pallid to pale yellowish, scutellum, clavus and apical area of corium, black; length 3.3—3.5 mm. . . . . schaffneri Kngt.

25.(20) Color golden yellow, clavus and spot on apical area of corium pale fuscous; length of antennal segment II just equal to basal width of pronotum; length 2.9 mm. . . . . luteus Kngt.
Color pale yellow to greenish, clavus and corium shaded with fuscous to black. 26

26. Antennal segment II not thicker than fore tibia. 27
Antennal segment II thicker than fore tibia; rostrum length at least two times width of head; length 2.9—3.1 mm. digitatus Kel.

27. Rostrum reaching well beyond hind coxae. 28
Rostrum reaching only to apex of hind coxae; genital segment without tubercle on dorsal margin; length 2.8 mm. similis Kelton

28. Hemelytra with golden to fuscous and black simple hairs, intermixed with spots and waves of white sericeous pubescence; right clasper broad, length only 2.5 times width on basal half; length 3.2 mm. . . . . longirostris Kngt.
Hemelytra with pale simple hairs, intermixed with silvery sericeous pubescence; right clasper more slender, length of exposed part, at least 3 times the width on basal half; length 2.9—3.0 mm. . . . . curacaoensis Kelton

29. (12) Dorsal surface more or less shaded with fuscous and black. 30
Dorsal surface, body and legs, uniformly rich lemon yellow; hemelytra without fuscous shading, membrane fuscous, veins yellow, a pale spot bordering apex of cuneus, a second spot on margin beyond. . . . . croceus Kngt.

30. Length of antennal segment II less than basal width of pronotum. 31
Length of antennal segment II equal to or exceeding basal width of pronotum. 33

31. Antennal segment II short, length not exceeding two-thirds basal width of pronotum; rostrum reaching upon genital segment; length 3.4 mm. . . . . brevicornis Kngt.
Antennal segment II longer, nearly equal to basal width of pronotum. 32

32. Antennal segment II slender, thickness not equal to that of front tibia near base; smaller, length 3.5 mm. . . gracilicornis Kngt.
Thickness of antennal segment II equal to basal thickness of fore tibia; larger, length 4.1 mm. . . . . grandis Kngt.

33. Length of antennal segment II about equal to basal width of pronotum. 36
Length of antennal segment II distinctly greater than basal width of pronotum. 34

34. Genital segment without tubercle. 35
Genital segment with distinct tubercle; rostrum just reaching upon hind coxae; length 3.5 mm. . . . . cuernavacae Kngt.

35. Antennal segment II in length equal to basal width of pronotum plus dorsal width of an eye; genital segment with strong blackish spot on ventral surface; length 4.2 mm. antennatus Kel.
Antennal segment II shorter, length not equal to basal width of pronotum plus dorsal width of an eye; genital segment with small inconspicuous fuscous spot on ventral surface; length 3.9 mm. . . . . obscurus Kngt.

36. Rostrum reaching to or upon the genital segment. 37
Rostrum just reaching upon posterior trochanters; length 3.9 mm. . . . . brevirostris Kngt.

37. Male genital segment with a prominent black spot on ventral surface; length 4.0 mm. . . . . chillcotti Kelton
Male genital segment without a black spot on ventral surface. . 38

38. Antennal segment II with thickness on apical half just equal to that of fore tibia. 39
Antennal segment II more slender, thickness not equal to that of fore tibia; rostrum reaching to middle of genital segment; length 3.1 mm. . . . . burkei Kngt.

39. Rostrum reaching to middle of genital segment; smaller, length 3.3 mm. . . . . immaculatus Kngt.
Rostrum just reaching to base of genital segment; larger, length 3.9 mm. . . . . medius Kngt.

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IOWA ASCOMYCETES IV. DIATRYPACEAE[1]

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ABSTRACT. Species of the Diatrypaceae collected in Iowa are described and discussed.

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The Diatrypaceae, in common with the fungi reported in previous papers of this series of studies of Iowa Ascomycetes (4, 5) are found predominately on the stems of woody angiosperms. They are considered to be saprophytes, although some species seem to be quite well established on very recently killed portions of their host plants.

As treated here, the Diatrypaceae are a family of the Xylariales, essentially the same as accepted by Luttrell (7). This family was placed in the Sphaeriales as the Allantosphaeriaceae by Wehmeyer (14) and by J. H. Miller (8), but as Luttrell has pointed out, the original concept of the latter family by von Höhnel (6) had a broader connotation. Therefore the name Diatrypaceae used by Nannfeldt (11) and Gäumann (3) avoids considerable confusion. Such treatment separates this group of fungi from the Diaporthales.

In Iowa, the genus Cryptosphaeria is represented by a single species on one host, Eutypa by 12 species on 65 hosts, Diatrype by 2 species on 25 hosts, and Diatrypella by 7 species on 30 hosts. The hosts listed for each species include only our Iowa material. Only the first collection of a species on a particular host at a given site is listed.

The authors are indebted to Dr. C. T. Rogerson for the privilege of examining collections in these genera from the herbarium of the New York Botanical Garden and to Dr. G. W. Martin for the opportunity of studying materials from the herbarium of the State University of Iowa. The Iowa material cited in Ellis and Everhart (2) is included.

Diatrypaceae Nannf.

Perithecia in stroma; stroma usually of mixture of fungus tissue and substrate, effuse to discrete, black, sometimes carbonaceous; perithecial neck usually elongated; ostiole schizogenous, periphysate, usually sulcate; hymenium of asci or asci and paraphyses lining sides and base of perithecial cavity; paraphyses persistent or evanescent at maturity; asci clavate to cylindrical, unitunicate, with long tapering stalks, thickened at apex, provided with pore surrounded by refractive ring in thickened apical wall, 8- to many-spored, persistent; ascospores allantoid to cylindric, smoky to light brown, one- to many-celled; conidia 1-celled, elongate cylindrical to filiform, curved or hamate, in exposed layers, open cavities, or enclosed in single or labyrinthiform chambers in the stroma; usually on stems of woody plants.

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Kay to the genera of the Diatrypaceae in Iowa

a. Stromata effuse, ostioles emerging separately, asci long stipitate, 8-spored, ascospores 2 or more celled. . 1. Cryptosphaeria
aa. Stromata effuse or pustulate, asci long-stipitate, 8- or many-spored, ascospores 1-celled.
b. Ectostromata absent to well developed, not deciduous, entostromata effuse or isolated, often with dark marginal zone, ostioles emerging separately or in clusters.
c. Asci 8-spored. . . . . 2. Eutypa
cc. Asci many-spored. . . . . 3. Diatrypella
bb. Ectostromata well developed and deciduous, entostromata erumpent with dark marginal zones forming a widely erumpent disc, ostioles emerging separately. . . . . 4. Diatrype

Cryptosphaeria Grev. emend. Wehm.

Stromata effuse or isolated; perithecia separately or collectively erumpent, usually surrounded by a dark marginal zone; no ectostroma formed; asci 8-spored; ascospores irregularly biseriate, allantoid to cylindrical, brown, one- to many-septate, often constricted; filiform paraphyses present, more or less persistent.

Conidial stage entostromatic, forming labyrinthiform pycnidia, when known.

A single species treated.

Cryptosphaeria eunomia (Fr.) Grev. (Figs. 1-3)

Entostromata scarcely visible externally, periderm slightly raised over widely effused areas, bark uniformly blackened on inner surface; perithecia thickly scattered, 600-700 μ in diameter, ostioles emergent singly, only occasionally sulcate; paraphysate; asci clavate, long stipitate, 90-100 x 15-20 μ (80-100 x 13 μ-Wehmeyer); ascospores biseriate, allantoid, hyaline, 1-celled at first, becoming straight cylindrical, dark brown, 1 to 4-celled, 20-26 x 3-4 μ at maturity.

Conidiophores lining irregular to labyrinthiform grooves, grooves sometimes coalescing; conidia hyaline, 1-celled, strongly curved, 40 μ (Ellis and Everhart), 13-20 x 1 μ (Wehmeyer, twig culture), 30-40 x 1 μ (Wehmeyer, in agar culture).

Exsiccati examined: Krieger Fung. Sax. 136; Barth. F. Col. 952; E. and E. N. A. F. 2nd Series 2825.

Specimens examined: On Fraxinus sp., Ames, Story Co., 1954, Tiffany; Fort Defiance State Park, Emmet Co., Aug. 18, 1962, Tiffany; Ledges State Park, Boone Co., July 23, 1957, Tiffany; Spillville, Winneshiek Co., June 1, 1958, Tiffany.

Eutypa Tul. emend.

Eutypa Tul. Sel. Carp. II:52, 1863
Quaternaria Tul. Sel. Carp. II:97, 1963
Eutypella Nit. Pyren. Germ. 165, 1875.

Stromata effuse or isolated; perithecia clustered or single and collectively or separately erumpent; ectostroma limited in development, usually in isolated patches, or absent; entostroma often well developed and pustulate, surrounded by a dark marginal zone, to sparsely developed without a marginal zone; ostioles punctate to sulcate; asci 8-spored, long stalked; ascospores biseriate, allantoid, yellowish-hyaline to brownish-hyaline.

Conidiophores free or enclosed, ectostromatic or entostromatic.

Prior treatments of the Diatrypaceae have separated Eutypa from Quaternaria and Eutypella as distinct genera. These separations were in part based on the grouping of the perithecia in the stroma, whether effuse (Eutypa) or collectively erumpent (Quaternaria and Eutypella). Quaternaria also had been separated from Eutypella in that in Quaternaria the conidial stage is ectostromatic as contrasted to the entostromatic conidial stage of Eutypella. Eutypa had within its species members with ectostromatic, entostromatic and hyphomycetous conidial stages.

In our discussion of the members of the Diaporthales, especially in the genus Diaporthe, the grouping of the perithecia within the stroma was not considered of value as a generic distinction. This concept of Diaporthe is that established by Wehmeyer's studies in the genus. Consistency would indicate that the same distinction be similarly treated here, and that the three genera should be considered to be extreme ranges of types within one large somewhat variable genus.

Key to the species of Eutypa

a. Ascospores small, 3-4 x 1 μ. . . . . 1. Eutypa scoparia
aa. Ascospores larger, up to 32 μ in length.
  b. Ascospores very large, over 20 μ in length.
    c. Perithecia monostichous, erumpent directly through the bark. . . . . 2. Eutypa ontariense
    cc. Perithecia clustered, erumpent through small discs. . . . . 3. Eutypa dissepta
  bb. Ascospores intermediate in size.
    d. Stromata effuse, perithecia emerging singly or in clusters.
      e. Ascospores less than 8 μ in length. . . . . 4. Eutypa lata
      ee. Ascospores more than 8 μ in length.
        f. Stromata a broad flat blister, ostioles separately erumpent, directly through bark. . . 5. Eutypa populina
        ff. Stromata otherwise.
          g. Stromata usually in denuded wood, accompanied by blackening of exposed surface.
            h. Perithecia buried in wood, monosticous or clustered. . . . . 6. Eutypa ludibunda
            hh. Perithecia in a thick black crust, bases only in wood, monostichous. . . . . 7. Eutypa spinosa
          gg. Stromata commonly in the bark.
            i. Stromata with white stuffing about the necks of the perithecia, ascospores 8-12 x 1.5-2 μ. . . . . 6. Eutypa ludibunda

ii. Stromata without white stuffing, ascospores 9-14 x 3-5 μ. . . . . 8. Eutypa vicinula

dd. Stromata restricted, occasionally merging, in clusters or singly.

j. Ascospores large, more than 10 μ in length.

k. Ostioles clustered, emergent through small discs with host bark generally undisturbed. . . . 9. Eutypa quaternata

kk. Ostioles erumpent singly, deeply sulcate, bark disrupted over entire stroma. . . . . 10. Eutypa daldiniana

jj. Ascospores small, less than 10 μ in length.

l. Erumpent clusters of ostioles 1-3 mm in diam., directly through bark, perithecia large. . . 11. Eutypa cerviculata

ll. Emergent clusters of ostioles usually elongate, through transverse cracks in bark, perithecia small, less than 500 μ in diameter. . . . . 12. Eutypa prunastri

1. Eutypa scoparia (Schw.) n. comb. (Figs. 4-7)

Eutypella glandulosa (Cke.) E. and E. North Amer. Pyren. 491, 1892.

Eutypella microcarpa E. and E. Jour. Myc. 4:122, 1888.

Eutypella deusta (E. and E.) E. and E. North Amer. Pyren. 489, 1892.

Eutypella heteracantha Sacc. Mich. 1:504, 1879.

Entostromata cortical, orbicular, 2-4 mm in diameter, often confluent, surrounded by a thin, black stratum, showing a distinct, black circumscribing line, raising the bark but slightly; perithecia 4-12 in a stroma, buried in the scarcely altered substance of the bark or wood, globose, 450-625 μ in diameter, contracted above into slender necks terminating in a close fascicle of more or less elongated, cylindrical, deeply 4-5-cleft ostioles erumpent through a small light brown disc, disc eventually obliterated by the emergent ostioles; asci clavate, long stipitate, 18-22 x 4 μ (sporiferous portion); ascospores allantoid, minute, strongly curved, yellowish-hyaline, 3-5 x 1 μ.

Exsiccati examined: E. and E. N. A. F. 2nd series 2343, 2517: Rabenhorst-Winter Fungi Europaei 2555; E. and E. F. Col. 1727, 1272: Langlois Fungi Ludo. 1334: Rehm Asco. 2088; Langlois Flora 1481 (mixed, Y of NYBG 1481 is E. scoparia).

Specimens examined:

On Ailanthus altissima (Mill.) Swingle, Ames, Story Co., April 15, 1958, Tiffany.

On Betula papyrifera Marsh., Ames, Story Co., April 18, 1961, R. M. Lewis.

On Gleditsia tricanthos L., Ames, Story Co., Jan. 8, 1951, R. M. Lewis; Ledges State Park, Boone Co., Sept. 1961, K. Juhl; Waubonsie State Park, Fremont Co., Sept. 8, 1961, Tiffany.

On Magnolia accuminata L., Ames, Story Co., Sept. 26, 1957, Tiffany.

On Pyrus malus L., Ames, Story Co., Sept. 1954, J. C. Gilman.

On Robinia pseudo-acacia L., Pine Lake State Park, Hardin Co., Sept. 15, 1957, Tiffany; Iowa City, Johnson Co., April 24, 1938, G. W. Martin (SUI).

On Ulmus americana L., Ames, Story Co., Mar. 1, 1941, McLaughlin; Dolliver State Park, Webster Co., Aug. 1954, Tiffany; Fort Defiance State Park, Emmet Co., Aug. 4, 1958, Tiffany; Iowa Lakeside Laboratory, Dickinson Co., July 17, 1960, Tiffany; Ledges State Park, Boone Co., July 23, 1957, Tiffany; Milford Woods, Dickinson Co., July 22, 1958, Tiffany; Woodman Hollow State Park, Webster Co., Oct. 5, 1958, Tiffany; No. 498, Stark.

On Ulmus fulva Michx., Ames, Story Co., Nov. 3, 1954, R. M. Lewis.

On Ulmus pumila L., Ames, Story Co., 1958, Tiffany.

On Ulmus sp., Ames, Story Co., March 18, 1951, R. H. Lewis; Fort Defiance State Park, Emmet Co., July 31, 1962, Tiffany; Iowa City, Johnson Co., Nov. 7, 1939, G. W. Martin (SUI); Ledges State Park, Boone Co., Sept. 1935, J. C. Gilman; Iowa?, J. A. Parish (SUI).

On down wood, Yellow River State Forest, Allamakee Co., July 31, 1959, Tiffany; Iowa City, Johnson Co., Sept. 7, 1937, G. W. Martin (SUI).

In many of the collections of E. scoparia tufts of brown hyphae extend from the disintegrating bark to the blackened surface of the wood. There is no evidence in our material of conidial production from these hyphae. Variation in length of perithecial necks within a given species is well demonstrated by a collection on Pyrus malus. A large apple limb, colonized by the fungus, was in contact with moist soil at one end only. The perithecial necks exposed beyond the surface of the bark were up to 1 mm in length in this area, gradually decreasing in length on the dryer, more exposed portion of the limb.

Young stromata of E. scoparia show the ostioles pushing through a small, light brown disc. The disc is gradually obliterated by the emerging perithecial necks, and is lost completely in fully mature pustules.

E. scoparia has been generally reported from species of Ulmus. The Iowa collections on other hosts seem to be indistinguishable from the material on elm.

The Langlois collection 1481 on which E. microcarpa E. and E. is based has two entities represented in the NYBG material. One, marked Y by C. L. Shear, is E. scoparia on denuded wood. The other, Shear's X, is Eutypa ludibunda. The details of the description of E. microcarpa are those of the Y portion, and are identical to E. scoparia.

The NYBG material of Langlois 1334, the type specimen of Valsa deusta E. and E., has a notation by Shear that the species is synonymous with Eutypa heteracantha Sacc. The collection is typical Eutypa scoparia after the upper portions of the bark have weathered away or sloughed away leaving the separate pustules of perithecia covered by the blackened stroma which dips to the cambium and is continuous over large areas of the wood. Some portions of the twigs show typical clusters of perithecial necks erumpent through the normal bark.

Wehmeyer maintains Eutypella glandulosa (Cke.) E. and E. on Ailanthus altissima is a separate entity from E. scoparia with E. glandulosa lacking a differentiated entostromatic area with a blackened zone present merely as a continuous blackened crust at the surface of the bark, with a marginal zone dipping deeply into the bark cutting off isolated areas, while the entostroma of E. scoparia is well developed. In our material on Ailanthus, the black line develops in the cambial region around the clusters of perithecia and up through the bark delimiting each cluster of

ostioles. The perithecial bases are in the wood. On Ulmus, the black line similarly delimits each cluster of perithecia, dipping into the bark between pustules, often to the cambium. The perithecia are contained in the bark. Except for the position of the basal portions of the perithecia, the fungi on the two hosts are indistinguishable. The much thicker bark on elm may well be the critical factor in this positional difference.

2. Eutypa ontariense (E. and E.) n. comb. (Figs. 8, 9, 11, 14)
Anthostoma ontariense E. and E. Proc. Acad. Nat. Sci. Phil. July, 1890:228.

Stromata convex, 1/4-1/2 mm diameter, more or less subseriately confluent for several centimeters, formed of the unaltered substance of the bark and surrounded by a black circumscribing line which follows along wood surface and penetrates the wood; perithecia crowded in the stroma, subglobose, 600-800 μ in diameter, thick walls, monostichous, deeply quadrisulcate erumpent ostioles; asci slender, long stipitate, 8-spored, 90-110 μ long (p. sp. 75-80 x 8-10 μ); abundant paraphyses; ascospores subbiseriate, cylindrical, moderately curved, brown, 20-26 x 4-4.5 μ.

Exsiccati examined: Dearness 1390; Shear 43; Shear New York Fungi 347; Peck, on dead Salix discolor, Kaner, N.Y., May, 1892.

Specimens examined:

On Salix discolor Muhl., Ames, Story Co., April 4, 1941, C. Knuths.

On Salix nigra Marsh., Sylwester, C.C. 47.

On Salix sp., Butler, C.C. 276; Marble Lake, Dickinson Co., Aug. 1, 1958, Tiffany.

In the Marble Lake material on Salix sp., the stromata were on older wood with a well developed bark and were only slightly raised above the surface, with blackening of the tissues developing to the basal line which followed along the cambium. The ostioles emerged singly with the bark cracking open around each ostiole. On the young stems of the other collections, the black stromata are obvious through the much thinner bark.

3. Eutypa dissepta (Fr.) n. comb. (Figs. 10, 12, 13)
Quaternaria dissepta Tul. Sel. Carp. II:107, 1863.
Valsa dissepta Fr. Summa Veg. Scand. 411, 1849.

Stromata mostly crowded, of irregular outline, 1-3 cm across and circumscribed by an irregular, undulate, black line; perithecia sunken in the unaltered substance of the bark, covered by the slightly raised epidermis, 2-6 in a stroma, subcircinate or irregularly scattered and even solitary, deeply buried and separate; ostioles convergent and piercing the epidermis together in a compact fascicle, but only slightly exserted; asci slender-clavate or cylindrical, long-stipitate, 8-spored, (p. sp. 120-140 x 16 μ); ascospores subbiseriate, allantoid, smoky-hyaline, 24-32 x 6-8 μ.

Exsiccati examined: Plowright Sphaer. Brit. 44: Cooke Fungi Brit. Exsic. 230; Rehm Asco. 49; Sydow Myco. Mari. 1718; Roum. Fungi. Gall. Exsic. 1476; Petrak Myco. Carp. 262; Petrak Flora Mora. III 7973.

Specimens examined:

On Acer saccharinum L., Willis, C. C. 112.

On Ulmus fulva Michx., Ames, Story Co., Nov. 29, 1954, R. M. Lewis.

On Ulmus sp., Dolliver State Park, Webster Co., Oct. 14, 1956, Tiffany; Gull Point State Park, Dickinson Co., July 24, 1958, Tiffany; Waubonsie State Park, Fremont Co., Sept. 8, 1961, Tiffany.

The black line dips to the surface of the wood or just into the bark delimiting large numbers of perithecial groups. The stromata are flattened with adherent bark broken only by the emergence of the ostioles.

4. Eutypa lata (Pers.) Tul. (Figs. 18, 19, 24)

Eutypa velutina (Wallr.) Sacc. F. Ven., Ser. IV:16, 1875; F. Ital., Tab. 472, 1878.

Stromata broadly effused, sunken in the wood which is darkened both on the surface and within, clothed at first with short, dark brown, thickly tufted conidial hairs, finally bare, lusterless, black, roughened by the numerous slightly exserted, conical or obtuse, 2-5 cleft ostioles; perithecia monostichous, thickly and mostly quite evenly scattered, globose, 350-400 μ in diameter with more or less elongated, slender necks; asci narrow-clavate, long-stipitate, 8-spored (p. sp. 20-30 x 4-5 μ); ascospores biseriate, allantoid, curved, light brownish, 5-7 x 1-1.5 (rarely 2) μ; scattered ectostromatic cushions with conidial locules; also free brown conidiophores.

Exsiccati examined: Sydow Myco. Mari. 4025, 3656; Sacc. Myc. Ital. 621, 624; E. and E. N. A. F. 2nd Ser. 2932, Cooke Fungi Brit. Ser. I, 375; Krieger Fungi Sax. 837; Rehm Asco. 2147.

Specimens examined:

On Populus tremuloides Michx., Decorah, Winneshiek Co., May 1892, E. W. Holway.

On Populus sp., Pine Lake State Park, Hardin Co., Sept. 15, 1957, Tiffany.

On Ulmus americana L., Ames, Story Co., Tiffany; Kanawha, Hancock Co., Aug. 27, 1955, R. M. Lewis.

On down wood, Ames, Story Co., 1959, Tiffany; Boone Co., Oct., 1963, Tiffany; Dolliver State Park, Webster Co., Aug. 1954, Tiffany; Fort Defiance State Park, Emmet Co., July 30, 1958, Tiffany; Gull Point State Park, Dickinson Co., July 1960, Tiffany; Ledges State Park, Boone Co., Aug. 1957, Tiffany; Woodman Hollow State Park, Webster Co., Oct. 12, 1962, Tiffany; Sioux City, Woodbury Co., June 26, 1960, K. Juhl.

Several species have been delimited within the range of the entity we are considering to be Eutypa lata. The minor differences used to delimit species do not seem to be consistent when a large amount of material is studied. A brown tomentum of hyphae and perhaps conidiophores may be developed on young material. This weathers away, exposing the blackened surface of the wood. Stromata may be limited to a surface blackening almost entirely, or may extend down around the perithecia to various depths. Some of these minor differences may be attributed to a difference in substrate as any piece of down wood seems to be a suitable substrate for this species.

5. Eutypa populina (Pers.) n. comb. (Figs. 15, 21, 23)

Cryptosphaeria populina (Pers.) Sacc. Syll. I:183, 1882.

Stromata cortical, effuse in patches of greater or less extent, 1/2 to 2 inches, in the bark which is blackened down to the wood, mostly swollen and raised on the surface in the form of a broad, flat blister, the margin gradually slanting off or abrupt, sometimes rising as much as 1 mm above the surrounding bark, a sclerotium-like layer formed immediately beneath the periderm, mostly somewhat blackened on the surface; perithecia evenly scattered, sphaerical to flattened, 500-600 μ in diameter, monostichous, ostioles erumpent, subhemispherical, rough and wrinkled to subconical at the apex, often obscurely quadrisulcate; asci narrow-clavate, long stipitate, (p. sp. 30-40 x 5-7 μ) (30-52 x 5-7 μ, Wehmeyer); ascospores biseriate, allantoid, yellowish, moderately curved, 8-10 x 2 μ.

Conidia filiform, hyaline, curved, 17-21 x 1-2 μ (on twigs in culture, Wehmeyer).

Exsiccati examined: Kreiger Fungi Sax. 175; Ellis N. A. F. 577. Specimens examined:

On Populus alba L., Ames, Story Co., Oct. 13, 1958, K. Juhl.

On Populus deltoides Marsh., Ames, Story Co., June 24, 1957, Tiffany; Fort Defiance State Park, Emmet Co., Aug. 4, 1958, Tiffany; Ledges State Park, Boone Co., June 4, 1958, Tiffany; Lost Island Lake State Park, Palo Alto Co., Aug. 13, 1958, Tiffany; C. C. 21.

On Populus grandidentata Michx., C. C. collection (immature).

On Populus nigra L. var. italica Muenchh., Ames, Story Co., June 28, 1957, Tiffany.

On Populus tremuloides Michx., Amana, Iowa Co., Oct. 5, 1957, Tiffany; Fort Defiance State Park, Emmet Co., Aug. 7, 1958, Tiffany; Holst State Forest, Boone Co., Dec. 21, 1959, Tiffany; Iowa City, Johnson Co., June 12, 1939, G. W. Martin (SUI).

On Populus sp., Amana, Iowa Co., Oct. 4, 1957, Tiffany; Ames, Story Co., June 24, 1957, Tiffany; Decorah, Winneshiek Co., Oct. 21, 1892, E. W. Holway; Ledges State Park, Boone Co., March 4, 1957, Tiffany; Pine Lake State Park, Hardin Co., Sept. 17, 1957, Tiffany; Waubonsie State Park, Fremont Co., June 24, 1960, K. Juhl; White Pine Hollow State Forest, Dubuque Co., July 30, 1964, K. Juhl; C. C. 413; C. C. 417.

In cultural studies with E. populina on twigs, Wehmeyer (13) found that a compact layer was formed immediately beneath the periderm. This became blackened and thickened, finally fused to form a sclerotium-like crust.

The external superficial appearance of E. populina is similar to that of Eutypa vicinula, Eutypa ontariense and Cryptosphaeria eunomia. In all of these species, the ostioles are individually erumpent through the bark and rather evenly scattered, while the stromatic area raises the surface of the host only slightly.

E. and E. Fungi Col. 2025, Eutypella radula (Pers.) E. and E. is Eutypa populina. E. radula does not seem to be different from E. populina, and probably should be considered to be a synonym.

6. Eutypa ludibunda Sacc. (Figs. 16, 17, 20, 22)

Eutypella constellata (B. & C.) E. & E. North Amer. Pyren. 498, 1892.

Eutypella fraxinicola (C. & P.) E. & E. North Amer. Pyren. 490, 1892.

Stromata often broadly effused to pulvinate or tuberculiform, formed of the unchanged or somewhat blackened substance of the bark or wood, sometimes hardly perceptible, delimited by a black line around single groups of perithecia or under a large area; perithecia subglobose, monostichous to clustered in valsoid groups, 350-450 μ in diameter, white furfuraceous material around the upper part of the perithecia; ostioles short to elongated, more or less deeply 4-5 sulcate; asci clavate, long stipitate (p. sp. 35-55 x 6-8 μ); ascospores biseriate, allantoid, rounded at ends, slightly curved, yellowish, 8-14 x 1.5-3 μ. Conidia in labyrinthiform pycnidia, filiform, yellowish to hyaline, curved, 20-25 μ long (16-19 x 0.5 μ, Wehmeyer), erumpent in yellow cirrhi.

Exsiccati examined: E. and E. N. A. F. 178, 189, 688, 689, 873; E. and E. N. A. F. 2nd Ser. 2118b; E. and E. Fungi Col. 728; Langlois Flora ludo. 2131, 2133, 2210, 2214, 2219; Rav. Fungi Carol. Fasc. 5, No. 62; Barth. Fungi Col. 1824; Sacc. Myc. Ital. 1474, 71, 72, 73, 279, 622, 837, 1655; Sacc. M. Ven. 1464; Rav. Fungi Amer. 363.

Specimens examined:

On Acer negundo L., Lake Macbride State Park, Johnson Co., July 20, 1960. K. Juhl; Ochemanpedan State Park, Emmet Co., Aug. 6, 1958, Tiffany; Pine Lake State Park, Hardin Co., Sept. 15, 1957, Tiffany.

On Acer platanoides L., Ames, Story Co., March 12, 1957, Tiffany.

On Acer saccharinum L., Kossuth Co., July 14, 1960, K. Juhl; Wanata State Park, Buena Vista Co., Aug. 18, 1958, Tiffany.

On Acer saccharum Marsh., Ames, Story Co., Dec. 4, 1958, R. M. Lewis; Decorah, Winneshiek Co., July 31, 1959, Tiffany; Fort Defiance State Park, Emmet Co., Aug. 8, 1958, Tiffany; White Pine Hollow State Forest, Dubuque Co., Oct. 27, 1962, Tiffany.

On Acer sp., Ames, Story Co., Oct. 12, 1955, Tiffany; Iowa?, J. A. Parish (SUI).

On Ailanthus altissima (Mill.) Swingle, Butler, L19.

On Amelanchier sp., Fort Defiance State Park, Emmet Co., Aug. 4, 1958; Tiffany.

On Amorpha fruticosa L., Marble Lake, Dickinson Co., Aug. 1, 1958, Tiffany.

On Betula papyrifera Marsh., Ames, Story Co., April 15, 1958, Tiffany.

On Betula sp., Ames, Story Co., May 12, 1955, R. M. Lewis.

On Caragana sp., Ames, Story Co., March 1955, R. M. Lewis.

On Carya cordiformis (Wang.) K. Koch. Woodman Hollow State Park, Webster Co., July 30, 1960, K. Juhl.

On Carya ovata (Mill.) K. Koch, Ames, Story Co., March 24, 1959, Tiffany; Backbone State Park, Delaware Co., July 30, 1959, Tiffany; Pilot Knob State Park, Hancock Co., Aug. 23, 1963, Tiffany; Springbrook State Park, Guthrie Co., July 16, 1964, K. Juhl; Woodman Hollow State Park, Webster Co., Oct. 12, 1962, K. Juhl.

On Carya sp., Ames, Story Co., July, J. C. Gilman and A. Welch; White Pine Hollow State Forest, Dubuque Co., July 5, 1960, K. Juhl.

On Celtis occidentalis L., Ames, Story Co., July 1956, Tiffany.

On Cercis canadensis L., Ames, Story Co., May 11, 1957, Tiffany.

On Cornus sp., Ledges State Park, Boone Co., Oct. 27, 1961, Tiffany and K. Juhl.

On Crataegus sp., Fort Defiance State Park, Emmet Co., July 30, 1958, Tiffany.

On Euonymus sp., Ames, Story Co., March 31, 1955, R.M. Lewis.

On Fraxinus pennsylvanica Marsh. var. lanceolata (Vahl.) Fern., Iowa Lakeside Laboratory, Dickinson Co., July 28, 1958, Tiffany.

On Fraxinus sp., Amana, Iowa Co., Oct. 4, 1957, Tiffany; Ames, Story Co., Jan. 1955, R.M. Lewis; Backbone State Park, Delaware Co., July 30, 1959, Tiffany; Ledges State Park, Delaware Co., July 20, 1959, Tiffany; Iowa?, J.A. Parish (SUI).

On Juglans nigra L., Ames, Story Co., April 12, 1957, Tiffany; Collins, Story Co., Sept. 21, 1958, Tiffany; Fort Defiance State Park, Emmet Co., Aug. 4, 1958, Tiffany; Wanata State Park, Buena Vista Co., Aug. 18, 1958, Tiffany.

On Juglans regia L., Cedar Falls, Black Hawk Co., April 27, 1957, Bragonier.

On Juglans sp., Amana, Iowa Co., Oct. 4, 1957, Tiffany.

On Magnolia accuminata L., Ames, Story Co., Sept. 26, 1957, Tiffany.

On Morus alba L., Ames, Story Co.

On Picea sp., Ames, Story Co., March 9, 1955, R.M. Lewis.

On Pinus strobus L., Spillville, Winneshiek Co., June 1, 1958, Tiffany.

On Platanus occidentalis L., Ames, Story Co., Sept. 9, 1954, Tiffany.

On Populus deltoides Marsh., Call State Park, Kossuth Co., Aug. 13, 1958, Tiffany.

On Populus sp., Amana, Iowa Co., Oct. 3, 1957, Tiffany; Call State Park, Kossuth Co., Aug. 13, 1958, Tiffany.

On Prunus serotina Ehrh., Ames, Story Co., April 9, 1958, Tiffany; Collins, Story Co., Sept. 21, 1958, Tiffany; Pilot Knob State Park, Hancock Co., Aug. 6, 1958, Tiffany.

On Prunus virginiana L., Gull Point State Park, Dickinson Co., July 24, 1958, Tiffany.

On Pyrus malus L., Ames, Story Co., Sept. 1954, J.C. Gilman; Iowa City, Johnson Co., Dec. 22, 1941, G.W. Martin (SUI).

On Quercus macrocarpa Michx., Iowa Lakeside Laboratory, Dickinson Co., Aug. 5, 1964, Tiffany.

On Quercus sp., Ames, Story Co., Nov. 3, 1954, Tiffany; Call State Park, Kossuth Co., Aug. 13, 1958, Tiffany; Fort Defiance State Park, Emmet Co., Aug. 4, 1958, Tiffany; Iowa City, Johnson Co., July 11, 1914, J.A. Parrish (SUI); Iowa Lakeside Laboratory, Dickinson Co., Aug. 1958, Tiffany; Tiffin, Johnson Co., April 9, 1927, G.W. Martin (SUI); Woodman Hollow State Park, Webster Co., May 11, 1959, Tiffany; Yellow River State Forest, Allamakee Co., July 31, 1959, Tiffany.

On Ribes missouriensis Nutt., Fort Defiance State Park, Emmet Co., Aug. 4, 1958, Tiffany.

On Ribes sp., Iowa, Dec. 1908, T.H. Macbride (NYBG); Ames, Aug. 14, 1961, R.M. Lewis.

On Robinia pseudoacacia L., Ames, Story Co., May 22, 1958, H.S. McNabb; Fort Defiance State Park, Emmet Co., Aug. 8, 1958, Tiffany; Wanata State Park, Buena Vista Co., Aug. 18, 1958, Tiffany.

On Robinia sp., Iowa?, J.A. Parish (SUI).

On Salix sp., Iowa Lakeside Laboratory, Dickinson Co., July 28, 1958, Tiffany.

On Sambucus canadensis L., Ames, Story Co., April 27, 1958, Tiffany; Wanata State Park, Buena Vista Co., Aug. 18, 1958, Tiffany.

On Smilax rotundifolia L., Ames, Sopers Mill, Story Co., May 23, 1957, Tiffany.

On Smilax sp., Backbone State Park, Delaware Co., May 30, 1958, Tiffany; Iowa City, Johnson Co., March 29, 1919, T.H. Macbride (SUI); Ledges State Park, Boone Co., May 11, 1951, Tiffany; Iowa, Nov. 1906, det. T. Bulat (SUI); Iowa, T.H. Macbride, (NYBG).

On Spiraea opulifolia L., Shenandoah, Page Co., Sept. 1924, I.E. Melhus.

On Tilia americana L., Ames, Story Co., April 22, 1958; Tiffany; Ames, Story Co., Soper's Mill, May 5, 1957, Tiffany; Backbone State Park, Delaware Co., July 30, 1959, Tiffany; Call State Park, Kossuth Co., Aug. 13, 1958, Tiffany; Dolliver State Park, Webster Co., Aug. 11, 1954, Tiffany; Fort Defiance State Park, Emmet Co., July 30, 1958, Tiffany; Holst State Forest, Boone Co., Dec. 21, 1957, Tiffany; Milford Woods, Dickinson Co., July 22, 1958, Tiffany; Palisades-Kepler State Park, Linn Co., July 21, 1960, K. Juhl; Stone Park, Sioux City, Woodbury Co., Aug. 9, 1956, Tiffany; Wanata State Park, Buena Vista Co., Aug. 18, 1958, Tiffany. Waubonsie State Park, Fremont Co., Sept. 8, 1961, Tiffany.

On Ulmus americana L., Ames, Story Co., Sept. 1954, J.C. Gilman; Fort Defiance State Park, Emmet Co., Aug. 10, 1960, Tiffany; Stark, CC191.

On Ulmus fulva Michx., Ames, Story Co., Jan. 16, 1955, R.M. Lewis.

On Ulmus sp., Ames, Sept. 16, 1953, Tiffany; Backbone State Park, Delaware Co., May 30, 1958, Tiffany; Decorah, Winneshiek Co., Sept. 1882, E.W. Holway, No. 322 (NYBG); Iowa City, Johnson Co., April 7, 1931, L.W. Miller (SUI); Aug. 17, 1943, G.W. Martin (SUI); Yellow River State Forest, Allamakee Co., July 31, 1959, Tiffany; Iowa?, J.A. Parish (SUI); Iowa?, J.A. Parish (SUI).

On Vitis labrusca L., Ames, Story Co., Aug. 15, 1955, Tiffany.

On Vitis labruscana Bailey, Ames, Story Co., April 20, 1955, R.M. Lewis.

On Xanthoxylum americanum Mill., Fort Defiance State Park, Emmet Co., Aug. 20, 1958, Tiffany.

On down wood, Ames, Story Co., June, 1956, Tiffany; Iowa?, Parish? (SUI).

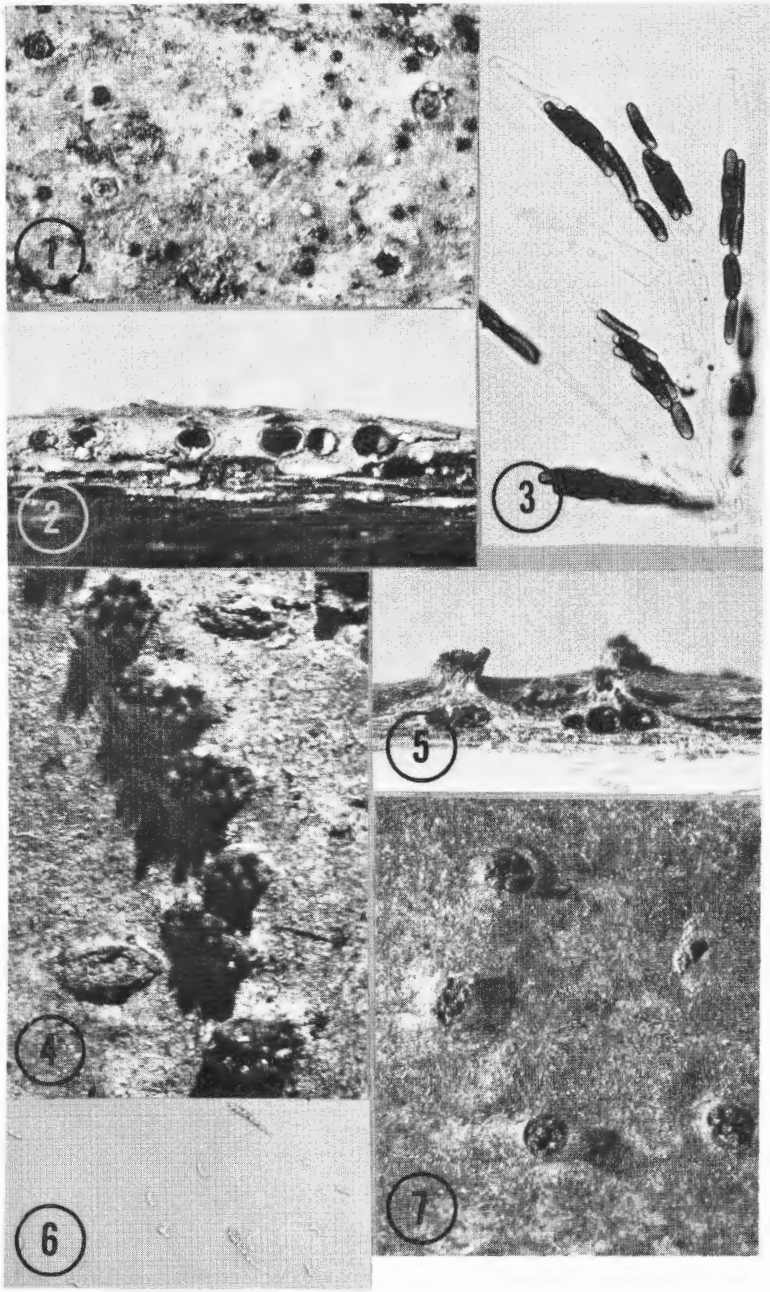
When individual stromata are closely grouped, the characteristic delimiting black line does not develop under the individual pustules, but is in evidence only at the outer edge of the total effuse area.

E. & E. N.A.F. 2118 is a mixed collection in the several examples

Figure 1. Habit of Cryptosphaeria eunomia
2. Longitudinal section, habit of C. eunomia
3. Asci of C. eunomia
4. Habit of Eutypa scoparia (old)
5. Longitudinal section, habit of E. scoparia
6. Asci and ascospores of E. scoparia
7. Habit of E. scoparia (young)

8. Habit of Eutypa ontariense (young)
9. Habit of Eutypa ontariense (older)
10. Habit of Eutypa dissepta
11. Longitudinal section, habit of E. ontariense
12. Longitudinal section, habit of E. dissepta
13. Ascus of E. dissepta
14. Asci of E. ontariense

15. Habit of Eutypa populina
16. Habit of Eutypa ludibunda on branch
17. Habit of Eutypa ludibunda on bare wood
18. Habit of Eutypa lata
19. Longitudinal section, habit of E. lata
20. Longitudinal section, habit of E. ludibunda
21. Longitudinal section, habit of E. populina
22. Ascospores of E. ludibunda
23. Ascus of E. populina
24. Asci and ascospores of E. lata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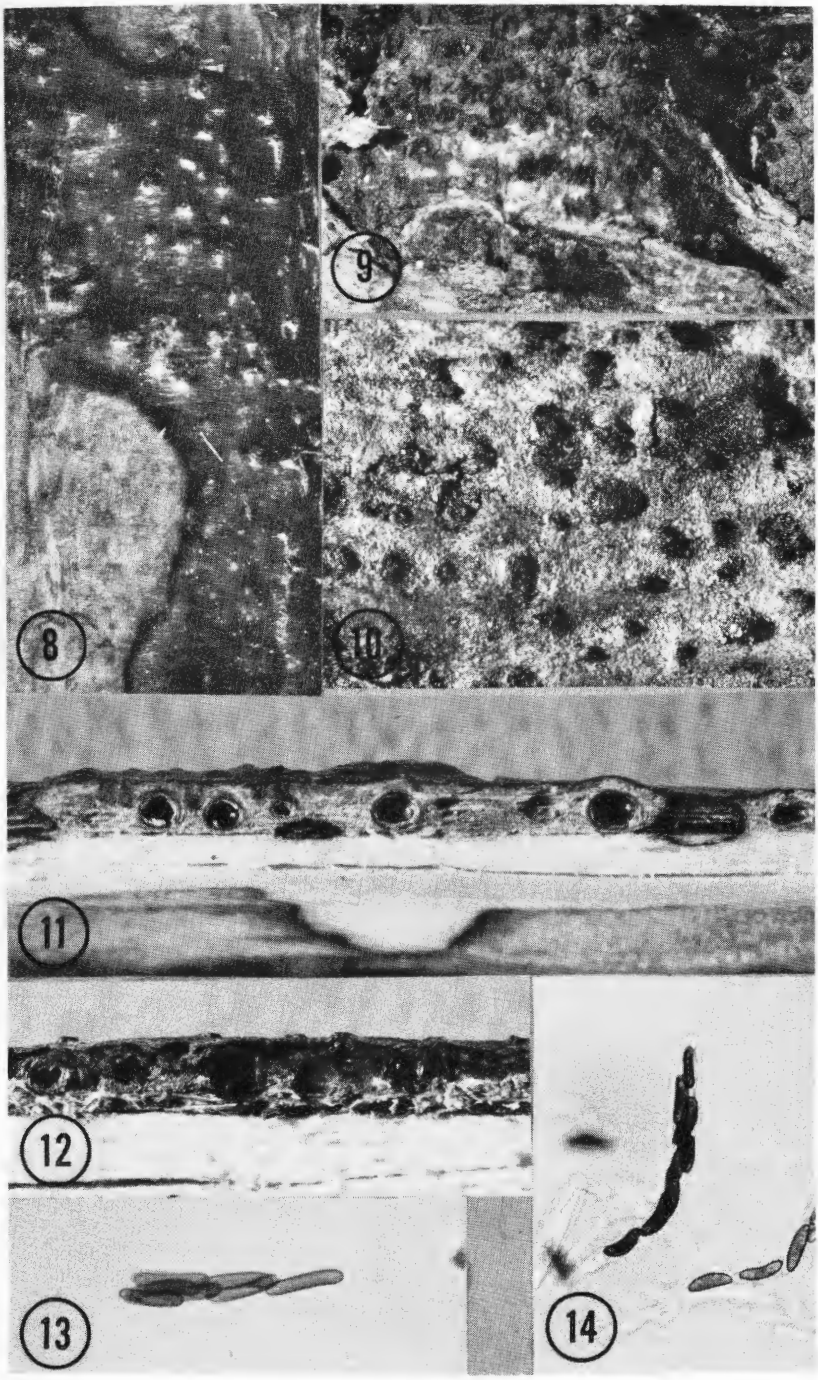
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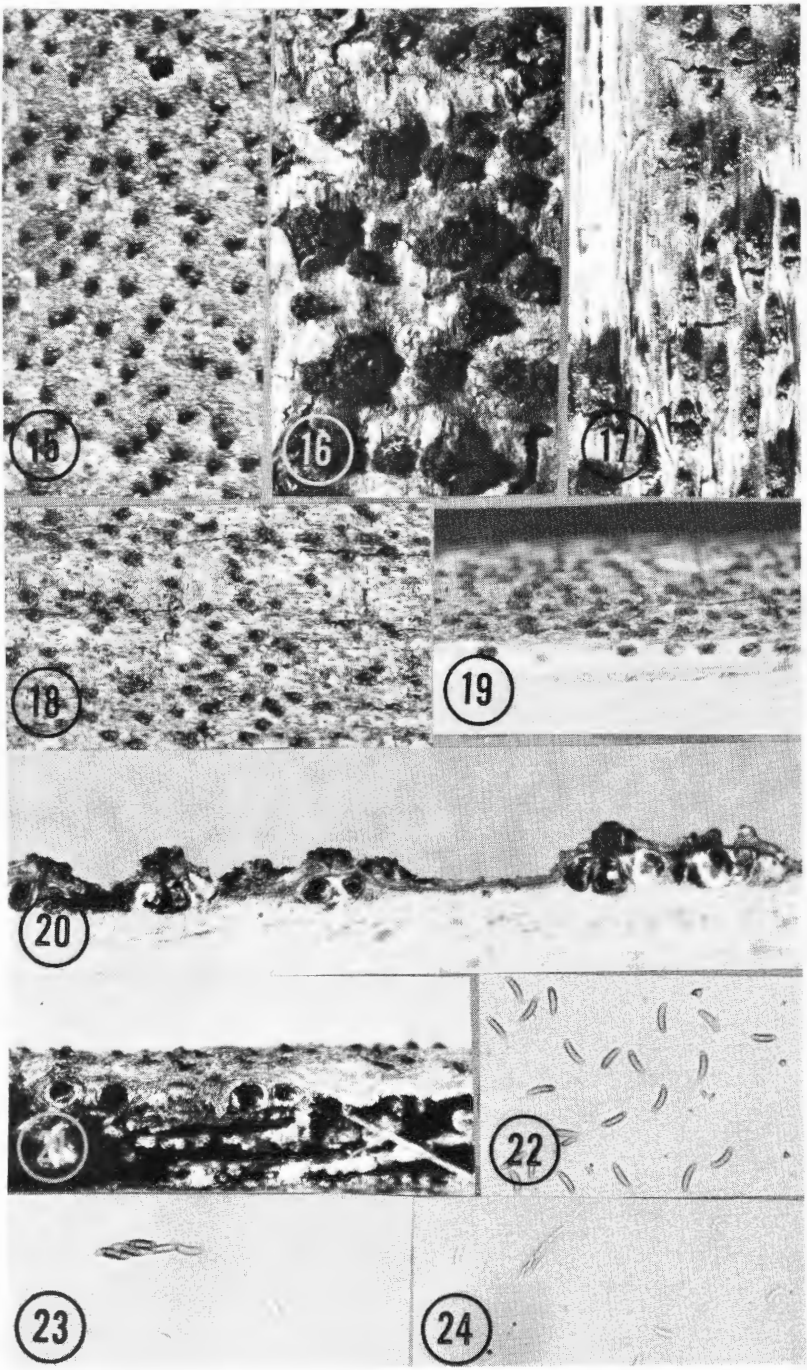
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that we have examined of this number, 2118a is Eutypa daldiniana, while 2118b is E. ludibunda.

The European collections of E. stellulata (Roum. Fungi Gallici 1279; Rehm Asco. 730, 730b, Plowright Sph. Brit. 42, vize Microfungi Brit. 164, Krieger Fungi Sax. 430) are similar to Eutypa cerviculata in stromal characters, with ascospores somewhat in the range of those of E. ludibunda. The individual pustules are separate and discrete, with limiting black lines and the ostioles emergent in tightly clustered groups. This is not the organism discussed as E. stellulata by Ellis and Everhart or as illustrated in their exsiccati.

The discussions of E. stellulata and E. ludibunda in North American Pyrenomycetes are of the same entity, on wood with the bark intact and absent, respectively. We consider all of these materials to represent the variable species E. ludibunda, as it occurs on a wide range of hosts in all stages of decomposition. We have not seen any American material that is E. stellulata comparable to the European collections.

All of the American material examined on Vitis is Eutypa ludibunda; however, some of the European specimens of Valsa Vitis are a Valsa, some are Eutypa ludibunda. E. & E. N. A. F, 873 is a mixed collection. The ISU 873 consists of three sticks; two have a Valsa, the third is colonized by Eutypa ludibunda.

7. Eutypa spinosa (Pers.) Tul. (Figs. 25, 26, 31)

Stromata widely effused, often for a foot or more in extent, seated in the wood or the thicker and harder parts of the bark; the outer layer of which is soon thrown off exposing the blackened matrix, forming a black crust of 2 to 4 mm thick, clothed at first with black conidiophores; perithecia buried in the black crust with basal portions extending into the surface of the wood or bark, globose to ovate, 450-550 μ in diameter, thickly crowded and thus becoming angular or flattened, with very large, thick, wrinkled, pyramidal, deeply 4 sulcate, exserted ostioles; paraphysate; asci narrow-clavate, long stipitate, 8-spored (p. sp. 30-40 x 5-6 μ); ascospores subbiseriate, allantoid, slightly curved, pale brownish or yellowish, 8-10 x 2 μ.

Conidia on simple or branched conidiophores, obovate, truncate at base, dark brown, 7 x 5 μ, solitary or verticillate, terminal.

Exsiccati examined: E. and E. N. A. F. 1183; Ravenel Fungi Amer. 92; Linhart Fungi Hung. 273; Rab. Fungi Eur. 3755.

Specimens examined:

On Crataegus sp., Ames, Story Co., March 16, 1955, R. M. Lewis.

On down wood, Ames, Story Co., 1957, Tiffany; Amana, Iowa Co., Oct. 4, 1957, Tiffany; Backbone State Park, Delaware Co., July 11, 1959, Tiffany; Ledges State Park, Boone Co., June 14, 1960, Tiffany and K. Juhl; Iowa City, Johnson Co., April 3, 1927, E. W. Emmons, J. H. Miller (SUI); Muscatine Co., B. Shimek, T. H. Macbride, (SUI); Pammel State Park, Madison Co., June 22, 1960, K. Juhl; Woodman Hollow State Park, Webster Co., Oct. 13, 196?, Tiffany; Iowa?, J. A. Parish (SUI); common, 1887, T. H. Macbride (SUI); T. H. Macbride (SUI).

On Quercus sp., Stephens State Forest, Lucas Co., May 4, 1962, K. Juhl; White Pine Hollow State Park, Dubuque Co., Oct. 27, 1962, M. Christensen; Shimek State Forest, Lee Co., May 4, 1962, Tiffany.

Collections of E. spinosa frequently do not have mature perithecia in an identifiable state of development. Several fruitings of the perithecia may form within a given stroma so that old empty perithecia and young developing ones may be present at the same time.

A wide brown zone extended to various depths into the wood, even though the blackened area is limited to the surface, as in N. A. F. 1183.

On denuded wood, the stroma extends primarily above the wood. The perithecia emerge separately or in small groups often closely packed, with the bases emergent from the stroma. The perithecial necks may become very long.

8. Eutypa vicinula (Nyl.) n. comb. (Figs. 27, 29, 32)

Cryptosphaeria vicinula (Nyl.) Karst. Mycol. Fenn. II:101, 1873.

Stromata effuse, discrete or confluent in uncolored interior cortex, or becoming black; perithecia immersed, erumpent in small groups of 1-5, more or less raising the bark, smooth, at first unchanged, becoming ashy, then held in a crust, continuous; perithecia 450-500 μ in diameter, globose or angular by mutual pressure, with very short necks and prominent ostioles, sometimes more or less sulcate and furrowed; paraphysate; asci cylindric-clavate, long stipitate (p. sp. 43-60 x 7-9 μ); ascospores biseriate to uniseriate, straight, slightly curved, oblong, light brown, 9-14 x 3-5 μ.

Exsiccati examined: Karsten, Finland fungi 272.

Specimen examined:

On Salix sp., Howard Co., along Turkey River, June 29, 1960, K. Juhl.

The structure of the stroma of E. vicinula is reported by Wehmeyer (14) to be the same as in E. populina, differing only in that the stromata of the former are more raised and develop in smaller patches. Blackening occurs around necks and upper parts of perithecia, not around the bases, with no black lines in the substrate.

Wehmeyer suggested that the dark-spored forms formerly in Cryptosphaeria, such as C. vicinula, would be included in his emended genus Anthostoma. We have placed the species formerly included in Anthostoma with smoky to brown, allantoid or slightly curved, biseriate to uniseriate ascospores in Eutypa. Thus Anthostoma in our interpretation would include only those species with black inequilateral uniseriate ascospores and would be included in the Xylariaceae.

9. Eutypa quaternata (Pers.) n. comb. (Figs. 28, 30, 33)

Quaternaria persoonii Tul. Sel. Carp. II p. 105, tab. XII, figs. 16-25, 1863.

Eutypella canodisca Ell. and Holway Proc. Acad. Nat. Sci. Phil., July, 1890:223.

Stromata discrete to subeffuse, sometimes coalescing, often bounded by a definite blackened zone; pustulate clumps of 3 to 6 circinate perithecia, rarely single or up to 10 perithecia, erumpent through small discs with bark only slightly raised about them; pustules thickly scattered; perithecia 500-600 μ in diameter, round to ovate; ostioles sulcate, sometimes scarcely sulcate; asci oblong-clavate, long stipitate (p. sp. 50-75 x 8-10 μ); ascospores biseriate, allantoid, only slightly curved, smoky-hyaline, 12-18 x 3-4 μ.

Exsiccati examined: Sydow M. Mar. 1949; Krieger Fungi Sax. 839; Barth. Fungi Col. 4768; Rehm Asco. 2018.
Specimens examined:

On Salix sp., Decorah, Winneshiek Co., May 9, 1886, E. W. Holway (NYBG); Ossian, Winneshiek Co., May 1886, E. W. Holway.

No dark lines are present around the clumps of perithecia in the bark; however, there is a blackened area at the cambium. The clusters of ostioles are erumpent through light brown discs. The ostioles are only slightly sulcate in our material, and the necks are not greatly elongated.

10. Eutypa daldiniana (deNot.) n. comb. (Figs. 34, 35, 38, 39)
Diatrype daldidiana de Not. Recl. Pyrenom: 481.
Diatrype radiata Ell. Am. Nat. 17:196, 1883.
Eutypella tumida (E. and E.) Wehm. Papers Mich. Acad. Arts, Science and Letters 5:180, 1925.
Diatrype tumida E. and E. No. Amer. Pyren. 567, 1892.

Stromata pulvinate, orbicular or oblong, 3-4 mm in diameter, subseriate and subconfluent for 1-2 cm, broad convex-tuberculiform, nearly black outside, white furfuraceous material around necks and upper portions of perithecia; perithecia 250-450 μ in diameter, buried below in the bark and circumscribed with a distinct black line; ostioles prominent but not elongated, erumpent singly, deeply quadrisulcate; asci sublanceolate, long stipitate (p. sp. 40-50 x 6-7 μ); ascospores subbiseriate, allantoid, yellowish, slightly curved, obtuse, 10-15 x 2.5-3 μ.

Conidia formed in labyrinthiform pycnidia developed in stromata, filiform, hamate, hyaline, 16-18.5 x 0.5 μ.

Exsiccati examined: E. and E. N. A. F., 2nd Ser. 2525; Barth Fungi Col. 2520, 2224, 2240; Roum. Fungi Gall. 1079.
Specimens examined:

On Morus sp., Butler, C. C. 288.

On Quercus sp., Ledges State Park, Boone Co., June 30, 1964, J. Haynes.

On Tilia americana L., Ames, Story Co., March 18, 1961, R. M. Lewis.

On Ulmus sp., Ames, Story Co., Aug. 1954, Tiffany; Decorah, Winneshiek Co., Sept. 1882, E. W. Holway, 266 (NYBG); Sept. 1882, E. W. Holway; Woodman Hollow State Park, Webster Co., Aug. 30, 1961, Tiffany, K. Juhl and R. M. Lewis.

On down wood, Ames, Story Co., May 15, 1962, K. Juhl; Decorah, May 1883, E. W. Holway (No. 322) (NYBG); Holst State Forest, Boone Co., Oct. 13, 1957, Tiffany; Waubonsie State Park, Fremont Co., July 22, 1964, K. Juhl; Iowa?, J. A. Parish (SUI).

Patches of bark adhere to the upper surface of the erumpent stromata. The distinct black surrounding line dips between stromata in the bark or down to and blackens the surface of the wood. These characteristics are also apparent in N. A. F. 2525. In one of our collections on Ulmus, the perithecial necks have become elongated and obscure much of the stroma.

Roumequire Fungi Gallici 1079 of D. daldiniana (NYBG) and E. and E. N. A. F. 2525 of D. tumida (NYBG) agree in stromatic characters. The only character separating D. daldiniana and D. tumida was spore size, with a size range of 12-15 x 2.5 in the former and 10-12 x 2.5-3 μ in the

latter. We consider these as one species, D. daldiniana. D. maclurae E. and E. is possibly a synonym.

11. Eutypa cerviculata (Fr.) n. comb. (Figs. 36, 40, 41)
Eutypella cerviculata (Fr.) Sacc. Syll. 1:146, 1882.

Stromata evenly scattered, 1/4-1/2 cm in diameter, sometimes confluent, erumpent as dense clusters of long perithecial necks 1 to 3 mm in diameter, surrounded by a black line which may penetrate deeply into the wood and may spread in the wood between stromatic areas; perithecia 15-25 or more in a cluster, crowded, 800 x 450-600 μ (600-750 x 450-550 μ); necks variable in length, ostioles 4-6 sulcate; paraphysate; asci narrow-clavate to cylindrical-clavate, long stipitate (p. sp. 30 x 4-5 μ) (35-52 x 3-4 μ - Wehmeyer); ascospores allantoid, 1-celled, yellowish, 5-8 x 1.5-2.5 μ.

Conidia in locules in or beneath the periderm, slightly curved to crescent-shaped, 1-celled, hyaline, in culture by Wehmeyer (13) 15-20 x 1 μ, 20-22 x .75 μ by Saccardo.

Exsiccati examined: E. and E. N. A. F. 2nd Ser. 1556, 1791, 2346, 2516, 3331; Rehm Asco. 1933; Shear New York Fungi 162, 243; Linhart Fungi Hung. 174; Barth. F. Col. 123; Ravenel Fungi Amer. 662.

Specimens examined:

On Alnus serrulata (Ait.) Willd., Osage, Mitchell Co., July 5, 1959, Tiffany.

On Alnus sp., Decorah, Winneshiek Co., May 30, 1892, E. W. Holway.

On Amelanchier sp., Ames, Story Co., Oct. 25, 1957, Tiffany.

On Carpinus caroliniana Walt., Backbone State Park, Delaware Co., July 11, 1959, Tiffany; Ledges State Park, Boone Co., June 1957, Tiffany; Boone Co., Sept. 1960, K. Juhl; Osage, Mitchell Co., July 5, 1959, Tiffany; Wanata State Park, Buena Vista Co., Aug. 18, 1958, Tiffany; Woodman Hollow State Park, Webster Co., May 11, 1959, Tiffany; Yellow River State Forest, Oct. 28, 1962, Tiffany; C. C. 599, Lee.

On Ostrya virginiana (Mill.) K. Koch, Decorah, Winneshiek Co., Aug. 1882, E. W. Holway.

On Quercus sp., Muscatine Co., Nov. 10, 1923, H. Monosmith (SUI).

On down wood, Iowa?, J. A. Parish (SUI); Ellis and Everhart (1892).

Typically the bark is not disturbed by the development of the stromata. The well-spaced clusters of sulcate perithecial necks are quite characteristic. As noted by Wehmeyer, in older specimens the bark between the individual stromata often crumbles and falls away.

Ravenel 534 (NYBG), originally identified as Diatrype haustellata (Fr.), is a good E. cerviculata. Diatrype haustellata is probably a synonym of E. cerviculata.

Specimens identified as Eutypella angulosa Nitsch. on Betula have larger stromata than does E. cerviculata on other hosts. The stromata vary in size with the size of the host lenticels, with a wide range in stromatal sizes on different aged branches. All of them have the same stromal structure and ascospores as typical E. cerviculata on Carpinus; therefore we have considered the angulosa material as one of extreme development within the range of E. cerviculata.

12. Eutypa prunastri (Pers.) n. comb. Figs. 42, 44, 47)
Eutypella prunastri (Pers.) Sacc. Syll. 1:147, 1882.

Stromata valsiform, suborbicular or elliptical in outline, pulvinate, convex or subconical, black, adnate to the wood, at first covered by the bark, finally erumpent through transverse cracks in the bark; perithecia numerous, 300-550 μ in diameter, irregularly crowded, sometimes in more than one layer, the central ones erect, the marginal ones ascending, subglobose or angular, attenuated into a neck of variable length; ostioles 3-5, generally 4 sulcate; asci narrow-clavate, long stipitate (p. sp. 20-30 x 3-4 μ); ascospores subbiseriate, allantoid, curved, subhyaline, 6-8 x 1.5 μ.

Conidia borne in labyrinthiform pycnidia, curved, 17 x 0.5 μ (Wehmeyer).

Exsiccati examined: Sphaer. Brit. 41; Fungi Brit. 237; Rabenhorst-Winter-Pazschke Fungi Europaei 3865; Karsten Finland Fungi 937; Shear New York Fungi 352; Roum. Fungi Gal. 1569, 3318; Sydow Myco. Mar. 3247, 276; Rehm Asco. 1894, 477.

Specimens examined:

On dead limbs of Prunus sp., Decorah, Winneshiek Co., May 1, 1892, E. W. Holway.

On Prunus sp., Decorah, Winneshiek Co., July 1883, E. W. Holway, No. 324 (NYBG).

On Tilia americana L., Iowa City, Johnson Co., May 25, Em. Drueger (SUI).

On down wood, Holst State Forest, Boone Co., Oct. 13, 1957, Tiffany; Iowa?, J. A. Parish (SUI).

The delimiting line is in the bark between pustules, dropping to the surface of the wood if the pustules are widely scattered.

Ostioles are often erumpent through lenticels with perithecial necks grooved along their entire exposed length, not just sulcate at apex.

Diatrypella Ces. and deNot. emend. Wehm.

Cryptovalsa Ces. and deNot. Schema. Sfer. Ital. 29, 1863.

Stromata effuse or isolated; ectostroma absent or strongly developed, but not deciduous; stroma well developed, often pustulate but usually not widely erumpent, bounded by a drak marginal zone; perithecia usually clustered, rarely separately erumpent; ostioles usually sulcate; asci long-stalked, polysporous; ascospores allantoid, one-celled, yellow-hyaline.

Imperfect stage of open labyrinthiform grooves lined with conidiophores. Conidiophores branched. Microconidia hyaline, short, slightly curved; macroconidia long, filamentous, curved, hyaline.

Key to the Iowa species of Diatrypella

a. Stromata effuse, perithecia erumpent in small clusters.
  b. Ascospores 12-15 μ long. . . . . 1. Diatrypella nitschkei
  bb. Ascospores 6-8 μ long. . . . . 2. Diatrypella eutypaeformis
aa. Stromata pulvinate.

c. Stromata deeply furrowed when young. . 3. Diatrypella cephalanthi
cc. Stromata not deeply furrowed.
d. Ascospores less than 10 μ long.
e. Entostroma olive green, on Acer sp. . . 4. Diatrypella frostii
ee. Stromata white.
f. Stromata up to 6 mm in diameter or larger, often flattened. . . . . 5. Diatrypella favacea
ff. Stromata 1-2 mm in diameter, bark adhering closely. . . . . 6. Diatrypella prominens
dd. Ascospores more than 10 μ long. . . . . 7. Diatrypella populi

1. Diatrypella nitschkei (Fckl.) n. comb. (Figs. 43, 45, 46, 48, 49)
Cryptovalsa nitschkei Fckl. Symb. Mycol. p. 212, 1869-70.

Stroma effused, innate in the bark, bark merely perforated by the ostioles, forming an irregular often interrupted area surrounded by a broad black line, enclosed areas somewhat pale; ostioles erumpent individually or in clusters of 2 or 3, often through pustulate yellow-green ectostromata; perithecia rather loosely scattered, 390-530 μ in diameter, ostioles quadrisulcate, barely erumpent; asci narrow clavate, long stipitate, polysporous, 80-86 x 12-15 μ (60-66 x 9 μ, Sacc.); ascospores allantoid, yellowish, 12-15 x 2-2.5 μ.

Exsiccati examined: On Ulmus americana L., Steer's Swamp, Ann Arbor, Mich., May 21, 1925, L. E. Wehmeyer; Sacc. Myco. Ital. 179; Dearness 2180.

Specimens examined:

On Crataegus mollis (T. and G.) Scheele, Stephens State Forest, Lucas Co., Aug. 21, 1960, K. Juhl.

On Crataegus spp., Ames, Story Co., March 23, 1948, Tiffany; Fort Defiance State Park, Emmet Co., July 30, 1958, Tiffany; Holst State Forest, Boone Co., July 30, 1960, K. Juhl; Marble Lake, Dickinson Co., Aug. 1, 1958, Tiffany; Wild Cat Den State Park, Muscatine Co., Aug. 23, 1960, K. Juhl.

On Populus deltoides Marsh., Iowa Lakeside Lab., Dickinson Co., Aug. 6, 1956, Tiffany.

On Prunus serotina Ehrh., Ames, Story Co., Oct. 20, 1957, Tiffany.

On Pyrus communis L., Ames, Story Co., Jan. 25, 1955, R. M. Lewis.

On Quercus alba L., Fort Defiance State Park, Emmet Co., July 30, 1958, Tiffany.

On Quercus rubra L., Ames, Story Co., Nov. 30, 1957, Tiffany.

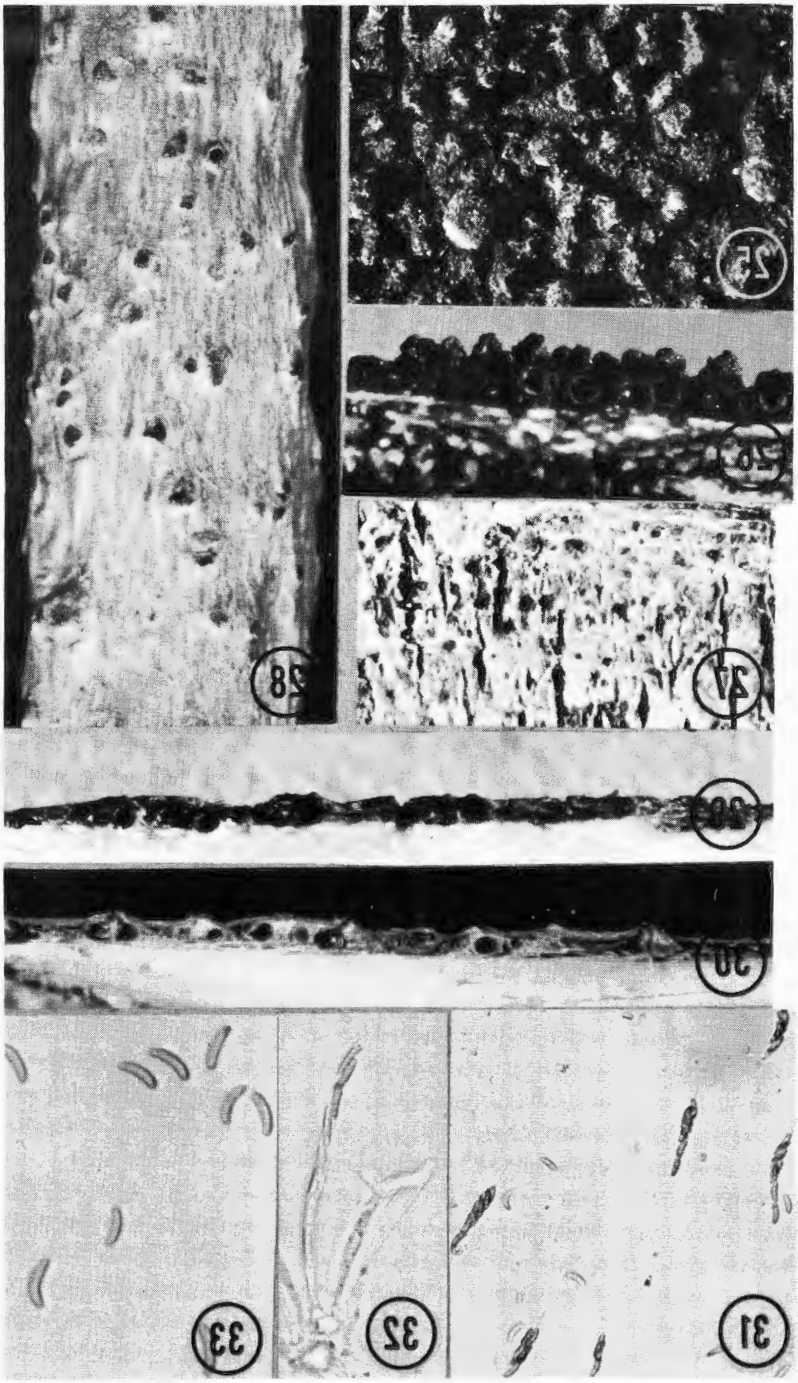
On Quercus spp., Ames, Story Co., March 22, 1957, Tiffany; Fort Defiance State Park, Emmet Co., Aug. 20, 1958, K. Juhl; Kossuth Co., near St. Joseph, July 14, 1960, K. Juhl; Lake Ahquabi State Park, Warren Co., July 5, 1958, Tiffany; Ledges State Park, Boone Co., Sept. 8, 1957, Tiffany; Wanata State Park, Buena Vista Co., Aug. 18, 1958, Tiffany.

On Ulmus americana L., Ames, Story Co., Nov. 30, 1954, R. M. Lewis; Decorah, Winneshiek Co., July 31, 1959, Tiffany; Oakland Mills State Park, Henry Co., August 4, 1960, K. Juhl; Shimek State Forest, Aug. 5, 1960, K. Juhl; Springbrook State Park, Guthrie Co., July 16, 1964, K. Juhl; White Pine Hollow State Forest, Dubuque Co., July 30,

Figure 25. Habit of Eutypa spinosa
26. Longitudinal section, habit of E. spinosa
27. Habit of E. vicinula
28. Habit of E. quaternata
29. Longitudinal section, habit of E. vicinula
30. Longitudinal section, habit of E. quaternata
31. Asci and ascospores of E. spinosa
32. Asci of E. vicinula
33. Ascospores of E. quaternata

34. Habit of Eutypa daldiniana (young)
35. Habit of Eutypa daldiniana (old)
36. Habit of Eutypa cerviculata
37. Longitudinal section, habit of E. daldiniana (young)
38. Longitudinal section, habit of E. daldiniana (old)
39. Ascus of E. daldiniana
40. Longitudinal section, habit of E. cerviculata
41. Ascus of E. cerviculata

42. Habit of Eutypa prunastri
43. Habit of Diatrypella nitschkei (old)
44. Longitudinal section, habit of E. prunastri
45. Longitudinal section, habit of D. nitschkei
46. Habit of D. nitschkei (young)
47. Ascus and ascospores of E. prunastri
48. Ascus of D. nitschkei
49. Ascospores of D. nitschkei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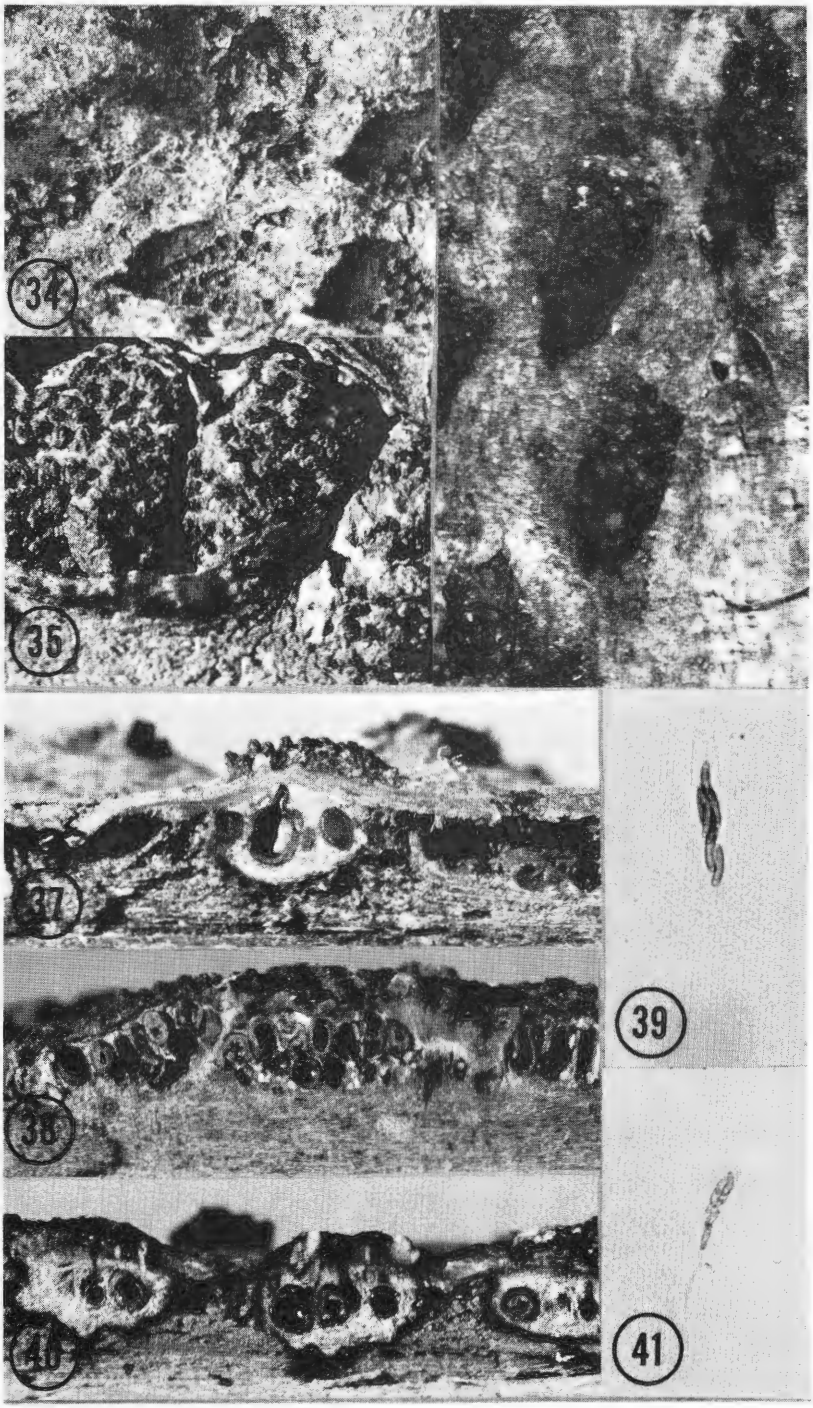
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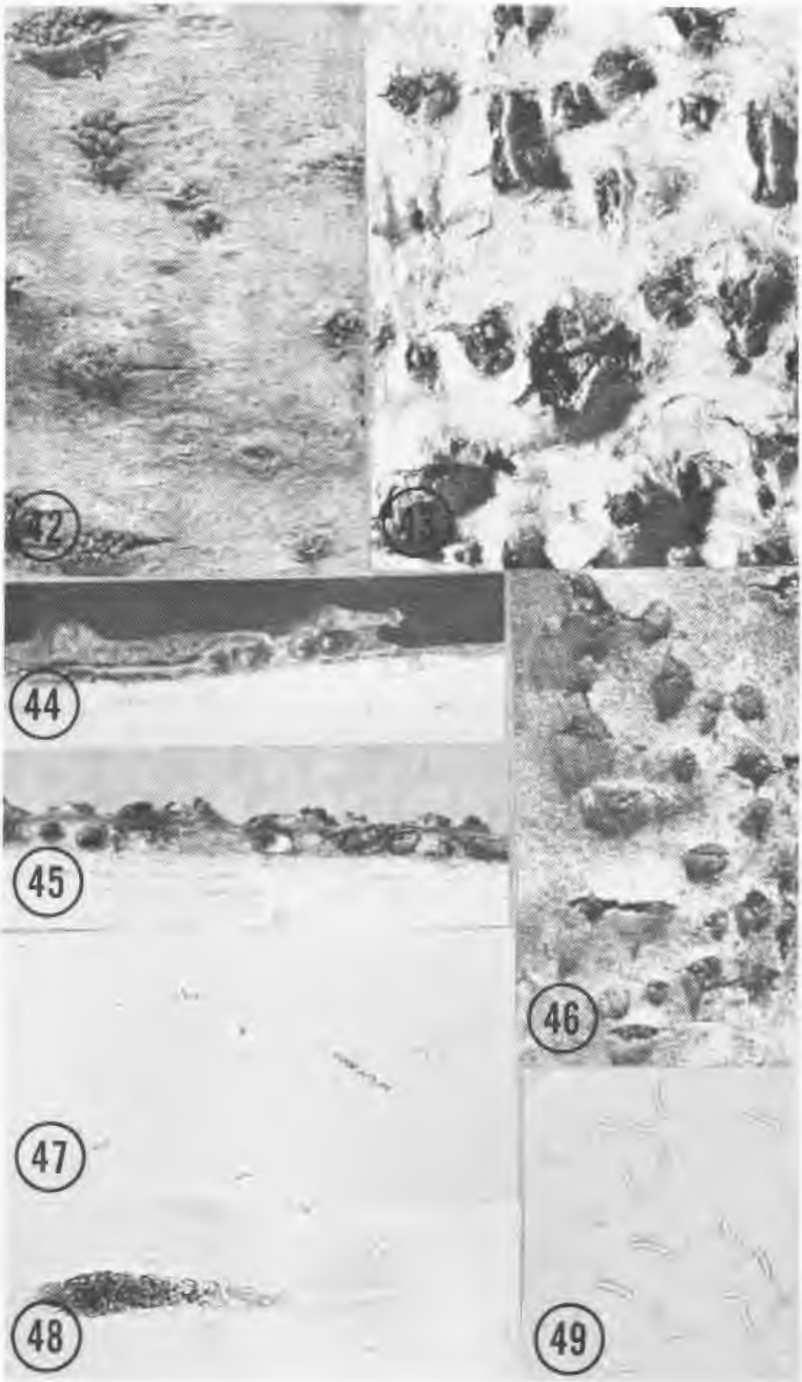
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1964, K. Juhl; Woodman Hollow State Park, Webster Co., Aug. 30, 1961, K. Juhl, L. H. Tiffany and R. M. Lewis; Willis, C. C. 162; C. C. 38.

On Ulmus fulva Michx., Ames, Story Co., Feb. 22, 1955, R. M. Lewis; Lake Ahquabi State Park, Warren Co., July 27, 1960, K. Juhl; Red Haw State Park, Lucas Co., Aug. 2, 1960, K. Juhl.

On Ulmus spp., Amana, Iowa Co., Oct. 3, 1957, Tiffany; Ames, Story Co., Nov. 3, 1954, R. M. Lewis; Dolliver State Park, Webster Co., Oct. 4, 1958, Tiffany; Fort Defiance State Park, Emmet Co., Aug. 7, 1958, Tiffany; Guttenberg, Clayton Co., July 5, 1960, K. Juhl; Ledges State Park, Boone Co., Nov. 9, 1958, Tiffany; Stevens State Forest, White Breast Unit, Lucas Co., Sept. 1, 1961, Tiffany and K. Juhl; Wanata State Park, Buena Vista Co., Aug. 18, 1958, Tiffany; White Pine Hollow State Park, Dubuque Co., July 5, 1960, K. Juhl; Woodman Hollow State Park, Webster Co., Oct. 5, 1958, Tiffany; Yellow River State Forest, Allamakee Co., July 31, 1959, Tiffany.

On down wood, Barkley State Park, Boone Co., June 17, 1961, K. Juhl; Stone Park, Sioux City, Woodbury Co., Aug. 9, 1956, Tiffany; Waubonsie State Park, Fremont Co., Sept. 8, 1961, Tiffany; White Pine Hollow, Dubuque Co., July 30, 1964, K. Juhl.

2. Diatrypella eutypaeformis n. comb. (Figs. 52, 54, 57)

Cryptovalsa eutypaeformis Sacc. Mich. II, 569, 1882.

Cryptovalsa pustulata (E. and E.) E. and E. No. Amer. Pyren. 516, 1892.

Cryptovalsa sparsa E. & E. Proc. Acad. Nat. Sci. Phil. July 1890, p. 224.

Entostroma effuse, bark tissues more or less blackened, black zone at margin, perithecia emergent singly or in clumps of 2-4, erumpent through the closely adhering bark, 450-555 x 375-500 μ, ostioles sulcate; asci polysporous, 70-75 x 8-10 μ (p. sp. 40-50 μ); spores allantoid, yellowish, moderately curved, 6-7 x 1.5 μ.

Exsiccati examined: Lang. Flora Ludo. 1190, 2207; E. and E. N. A. F. 3688; Ellis, on Lonicera, Newfield, N. J.; Kell. and Sw. 1926, Manhattan, Kansas, on Symphoricarpus vulgaris.

Specimens examined:

On Amelanchier sp., Ledges State Park, Boone Co., Oct. 27, 1961, Tiffany and K. Juhl.

On Carpinus caroliniana Walt., Ledges State Park, Boone Co., June, 1957, Tiffany.

On Juglans nigra L., Amana uplands, Iowa Co., Oct. 3, 1957, Tiffany; Pilot Knob State Park, Hancock Co., Aug. 6, 1953, Tiffany.

On Quercus imbricaria Michx., Lacey-Keosaqua State Park, Van Buren Co., Aug. 5, 1960, K. Juhl.

On Quercus macrocarpa Michx., Lake Ahquabi State Park, Warren Co., Aug. 27, 1960, K. Juhl.

On Quercus rubra L., Guttenberg, Clayton Co., July 5, 1960, K. Juhl.

On Quercus velutina Lam., Ames, Story Co., Jan. 31, 1961, R. M. Lewis.

On Quercus spp., Ames, Story Co., July 1957, Tiffany; Decorah, Winneshiek Co., July 31, 1959, Tiffany; Ledges State Park, Boone Co.,

Aug. 1954, R.M. Lewis; Pilot Knob State Park, Hancock Co., April 16, 1957, Tiffany; Stephens State Forest, Lucas Co., May 4, 1962, K. Juhl; Woodman Hollow State Park, Webster Co., Oct. 4, 1958, Tiffany.

On Ulmus spp., Decorah, Winneshiek Co., July 1884, E.W. Holway; Ledges State Park, Boone Co., Nov. 9, 1958, Tiffany.

On down decorticated wood, Backbone State Park, Delaware Co., April 30, 1960, Tiffany.

The collection on Quercus sp. from Woodman Hollow had conidial areas in the same stromata with young but mature perithecia. The conidial areas in the same stromata with young but mature perithecia. The conidia were hyaline, slightly to strongly curved, 30-34 x 1.5-2 μ.

3. Diatrypella cephalanthi (Schw.) Sacc. (Figs. 51, 53, 56)

Stromata scattered, 2-3 mm in diameter, at first small and subtubercular-erumpent, brown to black, apex generally traversed by a single longitudinal, deep furrow, giving the appearance of a Hysterium, but the furrow obliterated as the apex of the stroma protrudes still further, finally assuming an orbicular or elliptical form, 1-3 mm in diameter and roughened by the protruding black, rough, subconical ostioles which are often 3-4 sulcate; perithecia 6-20 in a group, closely packed, ovate or subangular, 450-650 μ in diameter, lying in and covered by the whitish substance of the stroma; asci 110-115 (p. sp. 75-80) x 8-10 μ, polysporous, long stipitate; ascospores allantoid, yellowish-hyaline, not strongly curved, 6-9 x 1.5 μ.

Exsiccati examined: E. and E. N.A.F. 777; E. and E. N.A.F. 2nd Ser. 1790; Dearness 1479.

Specimens examined:

On Cephalanthus occidentalis L., Pilot Knob State Park, Hancock Co., Aug. 6, 1958, Tiffany; Ledges State Park, Boone Co., Oct. 27, 1961, Tiffany and K. Juhl.

Ell. and Ev. N.A.F. 1790 identified as Diatrypella hysterioides E. and E. on decorticated wood is identical with N.A.F. 777 and with our material on Cephalanthus. It has the same deeply cleft stroma, with the cleft gradually obliterated with the emergence of the ostioles. There is no indication of orange-red in the stroma as reported for D. hysterioides.

4. Diatrypella frostii Pk. (Figs. 50, 55, 58)

Stromata wart-like, 1-2 mm in diameter, seated on the inner bark which is blackened and marked around each stroma with a circumscribing line penetrating to the wood, erumpent, surrounded and partly covered except at the apex, by the ruptured bark, yellow green within, single cluster of perithecia per stroma; perithecia ovate-globose, 10-15 in a cluster, 400-650 μ in diameter, asci polysporous, cylindric clavate long stipitate, paraphysate (p. sp. 75-80 x 12-15 μ); ascospores yellowish, allantoid, moderately curved, 7-8 x 2 μ.

Conidia (Wehmeyer) in locules in yellow-green ectostromatic disc curved filiform, hyaline, 30-50 x 1 μ.

Exsiccati examined: E. and E. N.A.F. 2nd Ser. 2529.

Specimens examined:

On Acer saccharinum L., Amana, Iowa Co., Oct. 3, 1957, Tiffany; Ames, Story Co., Jan. 3, 1954, R.M. Lewis.

On Acer saccharum Marsh. var. nigrum Michx., Ames, Story Co., Aug. 18, 1954, Tiffany; Backbone State Park, Delaware Co., July 11, 1959, Tiffany; Boone Co., Oct. 13, 1957, Tiffany; Call State Park, Kossuth Co., Aug. 15, 1960, K. Juhl; Fort Defiance State Park, Emmet Co., July 30, 1958, Tiffany; Maquoketa Caves State Park, Jackson Co., Aug. 28, 1961, Tiffany; White Pine Hollow State Forest, Dubuque Co., Oct. 27, 1962, Tiffany; Yellow River State Forest, Allamakee Co., July 31, 1959, Tiffany.

On Acer spp., Ames, Story Co., April 14, 1955, Tiffany; Backbone State Park, Delaware Co., April 30, 1960, Tiffany; Boone Co., May 3, 1955, Tiffany; Decorah, Winneshiek Co., Aug. 1882, E.W. Holway; Geode State Park, Henry Co., Aug. 4, 1960, K. Juhl; Guttenberg, Clayton Co., July 5, 1960, K. Juhl; Maquoketa Caves State Park, Jackson Co., July 22, 1960, K. Juhl.

A very common fungus on Acer species in Iowa. It is not showy, and has not been widely collected.

5. Diatrypella favacea (Fr.) Ces. and deNot. emend Croxall (Figs. 59, 62, 67)

Stromata isolated, irregularly scattered, often confluent below and of considerable extent, ovoid orbicular or irregularly angular, more or less erumpent through periderm, periderm commonly closely adherent, dirty brown or dark rust color to black, disk cometimes whitish; perithecia 3-30 in a stroma, closely crowded, ovoid orbicular, tapering into long narrow necks with 3-6 sulcate ostioles, 300-1000 μ in diameter; asci narrow-clavate, long stipitate, polysporous (p. sp. 60-130 x 8-11 μ), 130-250 μ total length; ascospores unicellular, allantoid, rounded at ends, dilutely yellowish, 6-8 x 1-2 μ.

Conidia borne on branched conidiophores on flat area without definite wall, typically formed in ectostroma, microconidia short, hyaline, slightly curved, 4-9 x 1 μ, macroconidia long filamentous, somewhat curved, hyaline 25-50 x 1 μ (18-40 x 1-1.5 μ, Wehmeyer-culture).

Exsiccati examined: E. and E. N.A.F. 686; E. and E. N.A.F. 2nd Ser. 2530; Krieger Fungi Sax. 178, 179, 1333; Sydow Myco. Mar. 4642, 1169, 3938, 1181, 467; Roum. Fungi Gall. 1091; Rehm Asco. 472, 2068; Shear New York Fungi 339; Plowright Sphaer. Brit. 20; Barth. Fungi Col. 2020; Holway, on Corylus, Decorah, Aug. 1882 (NYBG).

Specimens examined:

On Betula papyrifera Marsh., White Pine Hollow State Forest, Dubuque Co., Oct. 27, 1962, Tiffany.

On Betula sp., Decorah, Winneshiek Co., Aug. 12, 1882, E.W. Holway.

On Celtis occidentalis L., Ames, Jan. 1955, R.M. Lewis.

On Corylus americana Walt., Call State Park, Kossuth Co., Aug. 13, 1958, Tiffany; Backbone State Park, Delaware Co., April 30, 1960, Tiffany; Decorah, Winneshiek Co., Aug. 1882, E.W. Holway (NYBG); Sept. 1882, E.W. Holway (NYBG); Sept. 3, 1882, E.W. Holway; Fort Defiance State Park, Emmet Co., Aug. 4, 1958, Tiffany; Pilot Knob State Park, Hancock Co., Aug. 6, 1958, Tiffany.

On Populus tremuloides Michx., Call State Park, Kossuth Co., Aug. 15, 1960, K. Juhl.

On Prunus sp. (plum), Decorah, Winneshiek Co., May 1883, E.W. Holway 323 (NYBG).

On Quercus alba L., Backbone State Park, Delaware Co., July 29, 1964, J. Haynes; Holst State Forest, Boone Co., Dec. 21, 1957, Tiffany; Ledges State Park, Boone Co., July 13, 1958, Tiffany.

On Quercus macrocarpa Michx., Ames, Story Co., April 7, 1955, R.M. Lewis; Call State Park, Kossuth Co., Aug. 13, 1958, Tiffany; Fort Defiance State Park, Emmet Co., Aug. 10, 1960, Tiffany; Lakeside Laboratory, Dickinson Co., Aug. 7, 1964, J. Haynes; Marble Lake, Dickinson Co., Aug. 1, 1958, Tiffany; Milford Woods, Dickinson Co., Aug. 15, 1958, Tiffany.

On Quercus sp., Ames, Story Co., April 9, 1955, R.M. Lewis; Fort Defiance State Park, Emmet Co., Aug. 4, 1958, Tiffany; Fort Dodge, Webster Co., June 16, 1956, Tiffany; Iowa Lakeside Laboratory, Dickinson Co., Aug. 5, 1956, Tiffany; Holst State Forest, Boone Co., Oct. 25, 1959, Tiffany; Lake Ahquabi State Park, Warren Co., July 27, 1960, K. Juhl; Ledges State Park, Boone Co., May 1955, Tiffany; Milford Woods, Dickinson Co., Aug. 8, 1956, Tiffany; Pilot Knob State Park, Hancock Co., Oct. 1961, Tiffany; June 24, 1964, K. Juhl; Shimek State Forest, Donaldson Unit, Van Buren Co., June 24, 1964, J. Haynes; Yellow River State Forest, Allamakee Co., July 31, 1959, J. Helin; Waubonsie State Park, Fremont Co., Sept. 8, 1961, Tiffany.

Specimens on partially denuded twigs of Populus tremuloides Michx. are somewhat large and abnormal following the development of a second crop of perithecia in the old stroma.

Our collection of Celtis is placed in D. favacea with some question. The stromata are abnormal, for they seem to be several years old and have proliferated. Several fruitings of perithecia have occurred, and perithecia of various stages of formation and deterioration occur in close proximity.

6. Diatrypella prominens (Howe) E. and E. (Figs. 60, 63, 66)

Stromata wart-like, orbicular or angular, isolated, 1-1.5 mm in diameter, erumpent and closely girt by the ruptured epidermis, subprominent, whitish mealy within around necks and upper portions of perithecia, delimited by broad brown line which extends to wood; perithecia 4-8 in a stroma, subglobose, 400-600 μ in diameter, necks short, ostioles obtusely conical sulcate, slightly prominent; asci clavate-stipitate, 75-80 (p. sp. 55-60) x 10-12 μ, polysporous; ascospores allantoid, yellowish-hyaline, moderately curved, 6-8 x 1-1.5 μ.

Exsiccati examined: E. and E. N.A.F. 1335; Barth. Fungi Col. 238; Wehmeyer 2478; Shear New York Fungi 338.

Specimens examined:

On Platanus occidentalis L., Ames, Story Co., March 31, 1957, Tiffany; Ledges State Park, Boone Co., May 26, 1957, Tiffany; Iowa, C.C. 650.

In young stromata a brown outer surface with closely adhering bark around the sides and occasionally over a portion of the top is just pierced by the developing ostioles. Later it is partially or completely obliterated by the developing necks of the perithecia. The individual stromata may be quite single and discrete or closely clustered.

Eutypella platani (Schw.) Sacc. is possibly a synonym of D. platani. The ascospores of both species are the same; however, the description

of Eutypella platani in North Smerican Pyrenomycetes presents no information on ascus features as the asci in the material cited had disappeared.

7. Diatrypella populi Ell. and Holw. (Figs. 61, 64, 65)

Stromata well limited to rarely confluent, obricular, 2-3 mm in diameter, contained in the bark with bark adhering over the stromata, delimited by a black line, dirty white within, seated on the wood; perithecia ovate to subangular, 500-600 μ in diameter; ostioles erumpent singly or scattered directly through the bark or through a small disc, obscurely 4 sulcate; asci polysporous, clavate, long stipitate (p. sp. 100-115 x 15 μ); ascospores cylindrical, yellowish, curved, 10-12 (15) x 1.5-2 μ.

Exsiccati examined: Holway 349; Wehmeyer, July 15, 1925, on Populus deltoides Marsh., Indian Mound Park, Quincy, Ill.

Specimens examined:

On Populus deltoides Marsh., Ames, Story Co., 1957, Tiffany.

On Populus nigra L., C.C. 810.

On dead limbs of Populus sp., E.W. Holway (No. Amer. Pyrenomycetes).

On Populus spp., Ames, Story Co., Sept. 1923, J.C. Gilman; Nov. 1957, Tiffany; Decorah, Winneshiek Co., Aug. 1883, E.W. Holway 349 (NYBG); Iowa Lakeside Laboratory, Dickinson Co., July 1958, Tiffany.

In young material the ostioles emerge through small discs which barely pierce the bark and are obliterated by the emerging ostioles. The perithecia may be clustered in groups or single. Later the outer bark may flake away from around the obscure limited flattened stromata, leaving the bark still adherent over the surface of the stromata. The stromata are usually single, with a black line delimiting the stromata and developing between the stromata along the surface of the wood. Occasionally the perithecial necks protrude to varying lengths. The coalesced forms resemble Eutypa populi externally. With age successive crops of perithecia form and the individual stromata become more erumpent and irregular.

Diatrype Fr. emend Wehm.

Stromata effuse or isolated. Ectostroma strongly developed and deciduous. Stroma of fungous tissue forming a widely erumpent disc; dark marginal zone present. Perithecia parallel and separately erumpent. Ostioles sulcate. Asci 8-spored, long stalked. Ascospores biseriate, allantoid, one-celled, yellow-hyaline to light brown.

Imperfect stage ectostromatic.

Key to the Iowa species of Diatrype

a. Stromata widely effused, definitely limited. . . 1. Diatrype stigma
aa. Stromata more or less suborbicular to orbicular, gregarious or scattered. . . . . 2. Diatrype albopruinosa

1. Diatrype stigma (Hoff.) de Not. (Figs. 68, 71, 73)

Diatrype platystoma (Schw.) E. and E. No. Amer. Pyren. 1892.

Stromata widely effused, continuous or interrupted, often surrounding the limb, sometimes extending to cover the entire limb, at first covered by the epidermis, finally exposed, brownish or dusty-white, becoming darker or nearly black, whitish inside, 0.5-1 mm thick, sometimes undulate and of unequal thickness, the thinner parts then often sterile; perithecia monostichous, evenly distributed, ovate to elongated perpendicularly, 300-500 long, entire or 4 sulcate ostioles just reach surface of stromata; asci clavate to clavate-oblong, long stipitate, 8-spored (p. sp. 30-50 x 4-8 μ); ascospores biseriate, allantoid, yellowish, 6-9 x 1-1.5 μ (Ell. and Ev.), 6-12 x 1.5-2 μ (Saccardo), 6-12 (mostly 8) x 1-3 μ (Winter), 6-8 x 2 μ (Wehmeyer).

Conidia formed in locules, described by Wehmeyer from culture as crescent-shaped, hyaline, 9-10 x 1-1.5 μ; Fuisting reported three sizes of conidia, 24-30 x 0.5 μ, 10-18 x 1 μ, 6 x 1 μ; Tulasne, one conidial stage 4-6 x 1 μ.

Exsiccati examined; E. and E. N.A.F. 169, 491, E. and E. N.A.F. 2nd Ser. 2526, 3529; Barth. Fungi Col. 2831, 237; Rav. Fungi Amer. 357, 358, 359; Krieger Fungi Sax. 1125, 1127, 1128, 1129, 1130, 1131.

Specimens examined:

On Acer saccharum Marsh. var. nigrum Michx., Fort Defiance State Park, Emmet Co., Aug. 20, 1958, Tiffany; White Pine Hollow State Forest, Dubuque Co., Oct. 27, 1962, Tiffany.

On Acer sp., Woodman Hollow State Park, Webster Co., Oct. 5, 1958, Tiffany.

On Betula papyrifera Marsh., Ames, Story Co., April 15, 1958, Tiffany; Cedar Falls (probably), Black Hawk Co., J.A. Parish (ISU).

On Carpinus caroliniana Walt., White Pine Hollow, Dubuque Co., Oct. 27, 1962, Tiffany.

On Cercis canadensis L., Ames, Story Co., Nov. 21, 1954, R.M. Lewis.

On Crataegus margaretta Ashe, Story Co., April 23, 1942, T.E. Brooks.

On Ostrya virginiana (Mill.) K. Koch, Pammel Woods, Ames, Story Co., Mar., 1959, Tiffany.

On Quercus alba L. Fort Defiance State Park, Emmet Co., July 30, 1958, Tiffany.

On Quercus macrocarpa Michx., Milford Woods, Dickinson Co., July 22, 1958, Tiffany.

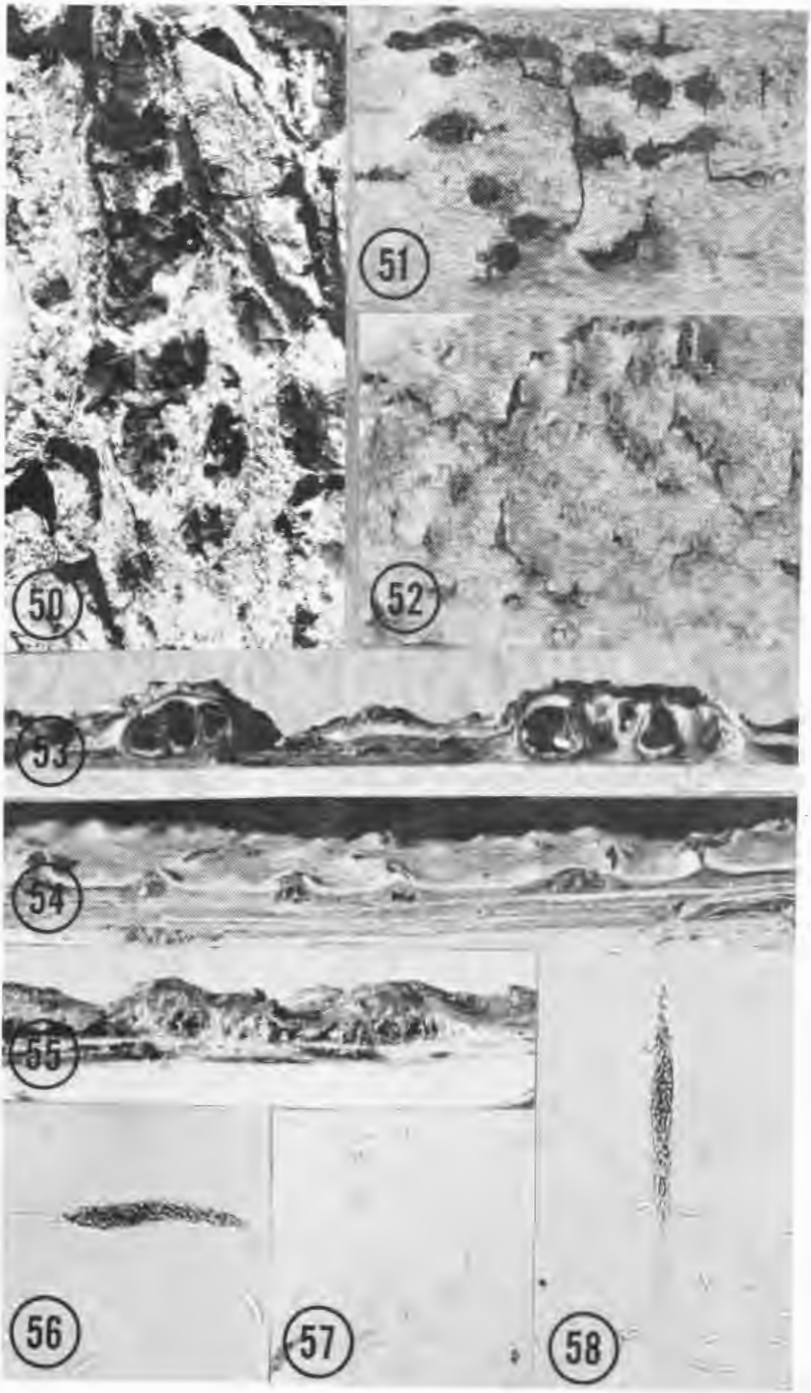
On Quercus velutina Lam., Maquoketa Caves State Park, Jackson Co., July 22, 1960, K. Juhl.

On Quercus spp., Amana, Iowa Co., June 24, 1964, J. Haynes; Ames, Story Co., Nov. 9, 1954, Tiffany; Collins, Story Co., Sept. 13, 1958, Tiffany; Decorah, Winneshiek Co., July 31, 1959, Tiffany; Fort Defiance State Park, Emmet Co., Aug. 10, 1960, Tiffany; Ledges State Park, Boone Co., 1958, Tiffany; Pilot Knob State Park, Hancock Co., April 16, 1957, Tiffany; Stephens State Forest, White Breast Unit, Lucas Co., Sept. 1, 1961, Tiffany and K. Juhl; White Pine Hollow, Dubuque Co., Oct. 27, 1962, Tiffany; Woodman Hollow State Park, July 30, 1961, K. Juhl.

Figure 50. Habit of Diatrypella frostii
51. Habit of Diatrypella cephalanthi
52. Habit of Diatrypella eutypaeformis
53. Longitudinal section, habit of D. cephalanthi
54. Longitudinal section, habit of D. eutypaeformis
55. Longitudinal section, habit of D. frostii
56. Ascus and ascospores of D. cephalanthi
57. Ascospores of D. eutypaeformis
58. Ascus and ascospores of D. frostii

59. Habit of Diatrypella favacea
60. Habit of Diatrypella prominens
61. Habit of Diatrypella populi
62. Longitudinal section, habit of D. favacea
63. Longitudinal section, habit of D. prominens
64. Asci of D. populi
65. Longitudinal section, habit of D. populi
66. Asci and ascospores of D. prominens
67. Asci and ascorpores of D. favacea

68. Habit of Diatrype stigma
69. Habit of Diatrype albopruinosa (young)
70. Habit of Diatrype albopruinosa (old)
71. Asci and ascospores of D. stigma
72. Ascus of D. albopruinosa
73. Longitudinal section, habit of D. stigma
74. Longitudinal section, habit of D. albopruinosa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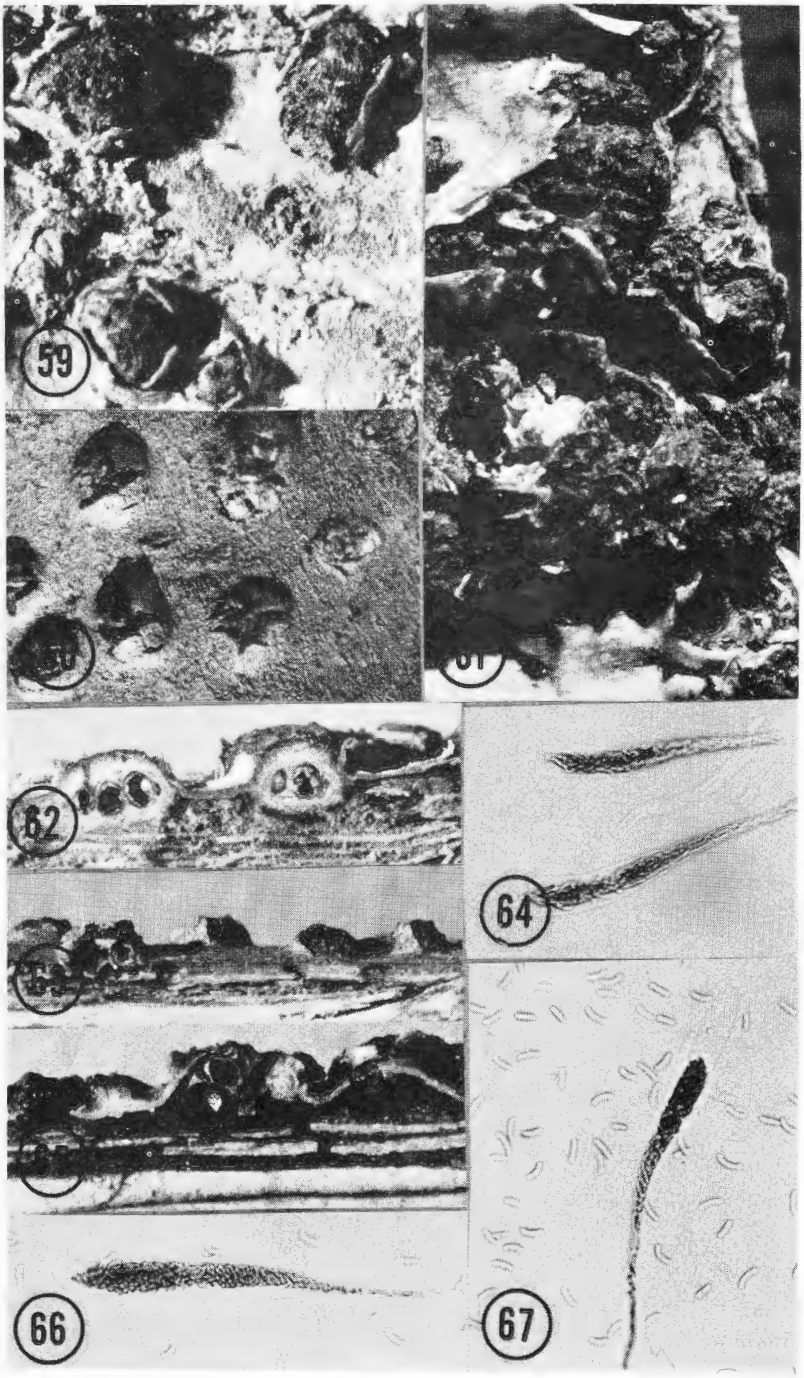
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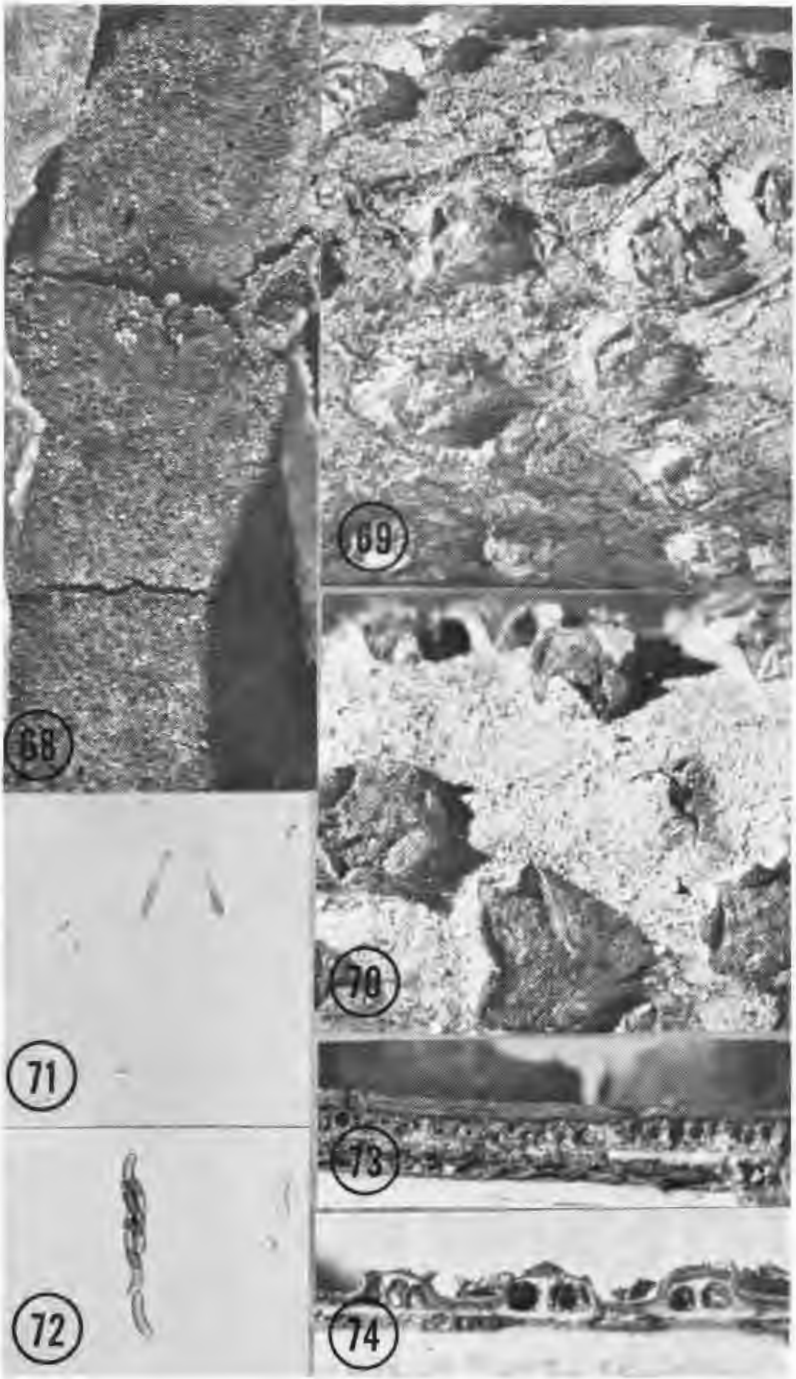
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On Ulmus spp., Lost Island State Park, Palo Alto Co., Aug. 13, 1958, Tiffany; Spillville, Winneshiek Co., June 1, 1958, Tiffany; Wanata State Park, Buena Vista Co., Aug. 18, 1958, Tiffany.

On down wood, Ames, Story Co., Oct. 25, 1957, Tiffany; Iowa City, Johnson Co., 1912, J.A. Parish (SUI); June 2, 1936, G.W. Martin (SUI); Oct. 31, 1936, G.W. Martin 3862 (SUI); Iowa? Macbride material (SUI); C.C. collection.

Diatrype stigma is quite common on Quercus. It often develops quickly after the death of the branch or tree, too much so not to have been at least in an early stage of development on the declining host. Often large parts of the tree may be involved.

2. Diatrype albopruinosa (Schw.) Cke. (Figs. 69, 70, 72, 74)

Anthostoma phaeospermum (Ell.) Sacc. Syll. 2 Addenda:14, 1883.

Eutypella phaeosperma (Ell.) Wehm. Amer. Jour. Bot. 13, 1926.

Stromata scattered or subgregarious, sometimes confluent, suborbicular, 1.5-2.5 (3-4 mm) broad, slightly convex, surrounded by the ruptured epidermis, whitish when young, finally becoming dark brown, light colored inside with waxy texture; perithecia 3-10 in a stroma, crowded, ovate or elliptic-oblong; 300-375 μ in diameter; ostioles more or less prominent, 3-5 sulcate; paraphyses; asci long stipitate, oblong-clavate (p. sp. 55-65 x 7 μ); ascospores biseriate, allantoid, obtuse, slightly curved, yellow-brown, 12-16 x 2.5-4 μ.

Exsiccati examined: E. and E. N.A.F. 2nd Ser. 2527, 1557; E. and E. Fungi Col. 40, 40b; Holway 228.

Specimens examined:

On Acer saccharinum L., Ledges State Park, Boone Co., July 7, 1959, Tiffany.

On Acer saccharum Marsh. var. nigrum Michx., Pammel Woods, Ames, Story Co., Oct. 11, 1962, Tiffany; Yellow River State Forest, Allamakee Co., Oct. 28, 1962, Tiffany.

On Acer sp., Ledges State Park, Boone Co., June 4, 1958, Tiffany.

On Amelanchier canadensis (L.) Medic., Decorah, Winneshiek Co., Aug. 23, 1882, E.W. Holway (NYBG); July 1884 (E. and E. N.A.F. 2nd Ser. 1557); Fort Defiance State Park, Emmet Co., Aug. 4, 1958, Tiffany.

On Betula papyrifera Marsh., Ames, Story Co., April 15, 1958, Tiffany.

On Carpinus caroliniana Walt., White Pine Hollow State Forest, Dubuque Co., Oct. 27, 1962, Tiffany; Woodman Hollow State Park, Webster Co., Aug. 31, 1961, K. Juhl, Tiffany and R.M. Lewis.

On Carya sp., Decorah, Winneshiek Co., May 15, 1892, E.W. Holway.

On dead Cornus sp., Iowa City, Johnson Co., March 26, 1933, G.W. Martin (SUI).

On Corylus americana Walt., Backbone State Park, Delaware Co., April 30, 1960, Tiffany; Call State Park, Kossuth Co., Aug. 13, 1958, Tiffany; Decorah, Winneshiek Co., May 20, 1882, E.W. Holway; May 24, 1882, E.W. Holway; Fort Defiance State Park, Emmet Co., Aug. 4, 1958, Tiffany; Holst State Forest, Boone Co., Dec. 21, 1957, Tiffany; Milford Woods, Dickinson Co., Aug. 13, 1958, Tiffany; Osage, Mitchell Co., July 7, 1959, Tiffany; Red Haw State Park, Lucas Co., Aug. 2, 1960 K. Juhl; White Pine Hollow, Dubuque Co., Oct. 27, 1962, Tiffany.

On Fraxinus americana L., Cedar Creek Unit, Stephens Forest, Lucas Co., Aug. 2, 1960, K. Juhl.

On Juglans nigra L., Yellow River State Forest, Allamakee Co., July 31, 1959, L. H. Tiffany.

On Ostrya virginiana (Mill.) K. Koch, Ames, Story Co., July 1957, Tiffany; Backbone State Park, Delaware Co., July 13, 1959, Tiffany; Call State Park, Kossuth Co., Aug. 13, 1958, Tiffany; Dolliver State Park, Webster Co., Oct. 14, 1956, Tiffany; Fort Defiance State Park, Emmet Co., Aug. 4, 1958, Tiffany; Lake Ahquabi State Park, Warren Co., July 27, 1960, K. Juhl. Holst State Forest, Boone Co., July 30, 1960, K. Juhl; Ledges State Park, Boone Co., July 11, 1955, Tiffany; Pilot Knob State Park, Hancock Co., Aug. 6, 1958, Tiffany; South City Park, Sioux City, Woodbury Co., June 25, 1960, K. Juhl; Waubonsie State Park, Fremont Co., Sept. 8, 1961, Tiffany; Wanata State Park, Buena Vista Co., Aug. 18, 1958, Tiffany; White Pine Hollow State Forest, Dubuque Co., Oct. 27, 1962, Tiffany.

On Ostrya sp., Iowa City, Johnson Co., Nov. 5, 1927, G. W. Martin (SUI); April 25, 1937, G. W. Martin (SUI); July 3, 1960, G. W. Martin (SUI); West Liberty, Muscatine Co., March 8, 1928,

On dead Populus sp., Homestead, Iowa Co., May 10, 1925, H. Mono-smith 721 (SUI).

On Prunus Sp., Milford Woods, Dickinson Co., July 22, 1958, Tiffany.

On Quercus alba L., Call State Park, Kossuth Co., Aug. 13, 1958, Tiffany; Fort Defiance State Park, Emmet Co., July 30, 1958, Tiffany; Guttenberg, July 5, 1960, Clayton Co., K. Juhl; Holst State Forest, Boone Co., July 30, 1960, K. Juhl; Ledges State Park, Boone Co., July 1957, Ronald Berckhan; Iowa? J. A. Parish (SUI).

On Quercus velutina Lam., Red Haw State Park, Lucas Co., Aug. 2, 1960, K. Juhl.

On Quercus spp., Amana, Iowa Co., Oct. 5, 1957, Tiffany; Ames, Story Co., June 22, 1955, Tiffany; Dolliver State Park, Webster Co., Oct. 5, 1958, Tiffany; Ledges State Park, Boone Co., May 5, 1955, Tiffany; Pilot Knob State Park, Hancock Co., April 16, 1957, Tiffany; J. A. Parish (SUI); Stephens State Forest, White Breast Unit, Lucas Co., Sept. 1, 1961, Tiffany and K. Juhl.

On Rhus sp., Fort Defiance State Park, Emmet Co., Aug. 7, 1958, Tiffany.

On Ulmus americana L., Iowa City, Johnson Co., June 4, 1936, G. W. Martin (NYBG).

On Ulmus sp., Amana, Iowa Co., Oct. 5, 1957, Tiffany; Ames, Story Co., Tiffany; Lake Macbride State Park, Johnson Co., July 20, 1960, K. Juhl.

On down wood, Iowa City, Johnson Co., Oct. 1909 (SUI); 1912, J. A. Parish (SUI); Ledges State Park, Boone Co., July 5, 1955, Tiffany; Stone Park, Sioux City, Woodbury Co., Aug. 9, 1956, Tiffany; Woodman Hollow State Park, Webster Co., Aug. 30, 1961, Tiffany; K. Juhl and R. M. Lewis; T. H. Macbride, Iowa (SUI).

Diatrype albopruinosa is easily recognized in all stages of development, and is one of the more common fungi on Carpinus and Ostrya. The Holway collections on Amelanchier have small young stromata, typical D. albopruinosa.

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Euonymus sp.
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PUBLICATIONS OF MEMBERS OF THE STAFF OF THE IOWA STATE UNIVERSITY FOR THE ACADEMIC YEAR 1964-65

Certain summaries and indices are of interest in a survey of the publications of members of the staff of an educational and research institution such as Iowa State University. The publications listed are in alphabetical order under the name of the senior author. Junior authors are also listed alphabetically with cross reference to senior author.

SUMMARY

Number of individuals listed.	809
Number of publications.	731
Number of publications with single author	241
Number of publications with joint authorship	590
Number of departments or fields represented in publications . .	51
Number of individuals who serve as editors or on the editorial staff of one or more scientific or technical periodicals.	50

Individuals thus serving are: O. P. Aggarwal, R. S. Allen, I. C. Anderson, T. A. Bancroft, E. R. Baumann, R. R. Beneke, C. A. Black, D. R. Boylan, R. E. Buchanan, W. F. Buchele, G. C. Christensen, H. W. Davey, H. T. David, P. G. Davies, R. H. Forsythe, A. E. Freeman, K. Frey, H. Gilman, Carol A. Greiner, R. L. Handy, A. O. Haugen, J. F. Heer, W. J. Hemmerle, J. B. Herrick, E. A. Hicks, M. S. Hofstad, Candace Hurley, N. L. Jacobson, O. Kempthorne, W. F. Kenkel, D. Kirkham, K. L. Knight, Helen R. Le Baron, W. R. Lockhart, W. E. Loomis, H. S. McNabb, Jr., A. W. Nordskog, W. E. Ogg, J. B. Page, J. Pesek, S. J. Rogal, R. V. Ruhe, A. D. Scott, R. H. Shaw, L. E. Thompson, W. H. Thompson, R. E. Warman, C. R. Weber, W. C. Wildman, and G. Zyskind.

INDEX TO PUBLICATIONS BY DEPARTMENTS OR FIELDS

INDEX BY RESEARCH INSTITUTES AND EXTENSION SERVICES

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Veterinary Medical Research Institute: Total 13 - Nos. 14, 15, 150, 176, 354, 426, 427, 527, 647, 702, 703, 728, 729

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